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EDMUND RUFFIN, EDITOR AND PROPRIETOR.

CLINE ON THE FORMATION OF ANIMALS.

To the Editor of the Farmers' Register.

Sir: It is not long since I returned from an agricultural excursion through some of the most interesting portions of England and Scotland. Being at Holkham, Norfolk, the seat of Thos. Wm. Coke, Esq. I met a large party of agriculturists whose attention was much devoted to the improvement of stock. Mr. Coke distributed, in small pamphlet form, a concise statement of the general principles by which he had for years been governed, in the selection and breeding of his stock—which is acknowledged to be among the finest in that country.

I was not so fortunate as to obtain a printed copy of the pamphlet, but subsequently procured a manuscript copy, which I place at your disposal, hoping you will give it an insertion in the Register, if you deem it worthy of being laid before your readers. P. H.

On the Form in General.

The form of domestic animals has been greatly improved, by selecting with much care the best formed for breeding; but, the theory of improvement has not been so well understood, that rules could be laid down for directing the practice. There is one point particularly, respecting which, the opinions of breeders have much varied, which is, whether crossing the breed be essential to improvement.

It is the intention of this communication to ascertain in what instances crossing is proper, and in what prejudicial; and the principles on which the propriety of it depends.

It has generally been supposed that the breed of animals is improved by the largest males. This opinion has done considerable mischief, and would have done more injury if it had not been counteracted by the desire of selecting animals of the best form and proportion, which are rarely to be met with in those of the largest size.

Experience has proved, that crossing has only succeeded in an eminent degree, in those instances in which the females were larger, than in the usual proportion of females to males; and that it has usually failed, when the males were disproportionally large.

The internal form of domestic animals has been much studied, and the proportions are well ascertained. But the external form is an indication only of internal structure. The principles of improving it, must therefore be founded on a knowledge of the structure and use of internal parts.

The lungs are of the first importance. It is on their size and soundness, that the health and strength of an animal principally depends: their power of converting food into nourishment, is in proportion to their size. An animal with large lungs, is capable of converting a given quantity of food into more nourishment than one with smaller lungs; and therefore, has a greater aptitude to fatten.

The Chest.

The external indications of the size of the lungs, are the size and form of the chest, the form of which should approach to the figure of a cone, leaving its apex situated between the shoulders, and its base towards the loins.

The capacity of the chest depends on its form more than on the extent of its circumference, for where the girth is equal in two animals, one may have much larger lungs than the other. A circle contains more than an ellipsis of equal circumference, and in proportion as the ellipsis deviates from the circle, it contains less. A deep chest, therefore, is not capacious, unless it is proportionately broad.

The Pelvis.

The pelvis is the cavity formed by the junction of the haunch-bones with the bone of the rump. It is essential that this cavity should be large in the female, that she may be enabled to bring forth her young with less difficulty.

When this cavity is small, the life of the mother and her offspring is endangered.

The size of the pelvis is chiefly indicated by the width of the hips, and the breadth of the twist, which is the space between the thighs.

The breadth of the loins is always in proportion to that of the chest and pelvis.

The Head.

The head should be small, by which the birth is much facilitated; the smallness affords other advantages, and generally indicates that the animal is of a good breed.

Horns are useless to domestic animals, and they are often causes of accidents. It is not difficult to breed animals without horns.

The breeders of horned cattle and horned sheep, sustain a loss more extensive than they may conceive; for it is not the horns alone, but also much more bone in the skulls of such animals to support their horns, for which the butcher pays nothing; and besides this, there is an additional quantity of ligament and muscle in the neck, which is of small value.

The skull of a ram with its horns weighed five times more than another skull which was hornless. Both these skulls were taken from sheep of the same age, each being four years old. The great difference in weight depended chiefly on the horns, for the lower jaws were nearly equal; one weighing seven ounces, and the other six ounces and three quarters, which proves that the natural size of the head was nearly the same in both, independently of the horns, and the thickness of bone which supports them.

In a horned animal, the skull is extremely thick. In a hornless animal, it is much thinner, especially in that part where the horns usually grow.

To those who have not reflected on the subject, it may appear of little importance whether sheep

and cattle have horns or no; but on a very moderate calculation it will be found that the loss in farming stock, and also in the diminution of animal food, is very considerable, from the production of horns and their appendages. A mode of breeding which would prevent the production of these, would afford a considerable profit in an increase of meat and wool, and other valuable parts.

The length of the neck should be proportioned to the height of the animal, that it may collect its food with ease.

The Muscles.

The muscles, and tendons which are their appendages, should be large, by which an animal is enabled to travel with greater facility.

The Bones.

The strength of an animal does not depend on the size of the bones, but on that of the muscles. Many animals with large bones are weak, their muscles being small.

Animals that were imperfectly nourished during growth, have their bones disproportionately large. If such deficiency of nourishment originated from a constitutional defect, which is the most frequent cause, they remain weak during life. Large bones, therefore, generally indicate an imperfection in the organs of nutrition.

On the Improvement of Form.

To obtain the most approved form, two modes of breeding have been practised; one by the selection of individuals of the same family, called breeding in and in: the other, by selecting males and females from different varieties of the same species, which is called crossing the breed.

When a particular variety approaches perfection in form, breeding in and in may be the better practice; especially for those who are not well acquainted with the principles on which improvement depends.

When the male is much larger than the female, the offspring is generally of an imperfect form. If the female be proportionably larger than the male, the offspring is of an improved form.

For instance, if a well-formed large ram be put to ewes proportionably small, the lambs will not be so well-shaped as their parents; and if a small ram be put to large ewes, the lambs will be of an improved form.

The proper method of improving the forms of animals, consists in selecting a well-formed female proportionably larger than the male.

The improvement depends on this principle, that the power of the female to supply her offspring with nourishment, is in proportion to her size, and the power of nourishing herself from the excellence of her constitution.

The size of the fœtus is generally in proportion to that of the male parent, and therefore when the female parent is disproportionably small, the quantity of nourishment is deficient, and the offspring has all the disproportions of a starveling.

But when the female from her size and good constitution, is more than adequate to the nourishment of a fœtus of a smaller male than herself, the growth must be proportionably greater.

The larger female has also a greater quantity of milk, and her offspring is more abundantly supplied with nourishment after birth.

To produce the best formed animals, abundant nourishment is necessary, from the earliest period of its existence until its growth is entire.

It has been observed in the beginning of the paper, that the power to prepare the greatest quantity of nourishment from a given quantity of food, depends principally on the magnitude of the lungs to which the organs of digestion are subservient.

To obtain animals with large lungs, crossing is the most expeditious, because well formed females may be selected from a variety of a large size, to be put to a well formed male of a variety that is rather smaller.

By such a method of crossing, the lungs and heart become proportionably larger, in consequence of a peculiarity in the circulation of the fœtus, which causes a larger proportion of the blood under such circumstances, to be distributed to the lungs, than to the other parts of the body, and as the shape and size of the chest, depend on that of the lungs, hence arises the remarkably large chest which is produced by crossing with females that are larger than the males.

The *practice* according to this principle of improvement, however, ought to be limited; for it may be carried to such an extent, that the bulk of the body might be so disproportioned to the size of the limbs, as to prevent the animals from moving with sufficient facility.

In animals where activity is required, this practice should not be extended so far as in those which are intended for the food of man.

On the Character of Animals.

By character in animals is here meant those external appearances by which the varieties of the same species are distinguished. The characters of both parents are observed in their offspring, but that of the male most frequently, predominates. This may be illustrated in the breeding of horned animals, among which there are many varieties of sheep, and some of cattle, which are horned.

If a hornless ram be put to a horned ewe, almost all the lambs will be hornless, partaking of the character of the male, more than of the female parent.

In some counties, as Norfolk, Wilkshire, and Dorsetshire, most of the sheep have horns. In Norfolk, the horns may be got rid of by crossing with Ryland rams, which would also improve the form of the chest and the quantity of the wool.

In Wilkshire, and Dorsetshire, the same improvement might be made by crossing the sheep, with South-down rams.

An offspring without horns might be obtained from the Devon cattle, by crossing with the hornless bulls of the Galloway breed. This would also improve the form of the chest, which the Devons are often deficient in.

Examples of the good effects of Crossing the Breed.

The great improvement of the breed of horses in England arose from crosses with the diminutive stallions, Barbs, and Arabians; and the introduction of Flanders mares into this country, was the

source of improvements in the breed of cart horses.

The form of swine has also been greatly improved by crossing with the small Chinese boar.

Examples of the bad effects of Crossing the Breed.

When it became the fashion in London to drive large bay horses, the farmers in Yorkshire put their mares to much larger stallions than usual, and thus did infinite mischief to their breed by producing a race of small chested, long legged, large headed, worthless animals.

A similar project was adopted in Normandy to enlarge the breed of horses there, by the use of stallions from Holstein; and in consequence, the best breed of horses in France would have been spoiled had not the farmers discovered their mistake in time, by observing the offspring much inferior in form to that of the native stallions.

Some graziers in the Isle of Shepley conceived that they could improve their sheep by large Lincolnshire rams, the produce of which was however much inferior in the shape of the carcase, and the quality of the wool, and their flocks were greatly injured by this attempt to improve them.

Attempts to improve the native animals of a country, and by any plan of crossing should be made with the greatest caution; for by a mistaken practice extensively pursued, irreparable mischief may be done.

In any country where a particular race of animals has continued for centuries, it may be presumed that their constitution is adapted to the food and climate.

The pliancy of the animal economy is such, as that an animal will gradually accommodate itself to very great vicissitudes in climate and alterations in food, and by degrees undergo great changes in constitution; but these changes can be effected only by degrees, and may often require a great number of successive generations for their accomplishment.

It may be proper to improve the form of a native race, but at the same time it may be a very injudicious attempt to enlarge the size.

The size of animals is commonly adapted to the soil which they inhabit. Where produce is nutritive and abundant, the animals are large, having grown proportionally to the quantity of food which for generations they have been accustomed to obtain. Where the produce is scanty the animals are small, being proportioned to the quantity of food which they are able to procure—of these contrasts the sheep of Lincolnshire, and of Wales, are examples. The sheep of Lincolnshire would starve on the mountains of Wales.

Crossing the breed of animals may be attended with bad effects in various ways and that even when adopted in the beginning on a good principle; for instance, suppose some larger ewes, than those of the native breed were taken to the mountains of Wales and put to the rams of that country—if these foreign ewes were fed in proportion to their size, their lambs would be of an improved form, and larger in size than the native animals; but the males produced by this cross though of a good form would be disproportionate in size to the native ewes, and therefore, if permitted to mix with them, would be productive of a starveling illformed progeny. Thus a cross which was at first an improvement would by giving occasion to a contrary cross ultimately prejudice the breed.

The general mistake in crossing has arisen from an attempt to increase the size of a native race of animals, being a fruitless effort to counteract the laws of nature.

The Arabian horses are in general the most perfect in the world; which probably has arisen from great care in selection and also from being unmixed with any variety of the same species; the males therefore have never been disproportioned to the size of the females.

The native horses of India are small, but well proportioned, and good of their kind. With the intention of increasing their size, the India company have adopted a plan of sending large stallions to India. If these stallions should be extensively used, a disproportioned race must be the result, and a valuable breed of horses may be irretrievably spoiled.

From theory, from practice, and from extensive observation, which is more to be depended on than either, it is reasonable to form this

Conclusion.

It is wrong to enlarge a native breed of animals; for in proportion to their increase of size they become worse in form, less hardy, and more liable to disease.

From the Silkworm.

SILK CULTURE PROPOSED AT CAPE FLORIDA.

Cape Florida Light-House, April, 15, 1836.

Sir,—I have lately seen a publication entitled the Silkworm, published under your direction; and supposing you interested in the successful cultivation of the article to which it is directed, I take the liberty, although a stranger, to address you a few lines—not for the purpose of furnishing you with any additional information on the subject—but merely, through your paper, to call the attention of the public (or that portion of it who feel an interest in the manufacture of *Silk*) to Cape Florida, as a part of our country best calculated for the production of this article. I have, for the last eleven years, resided at this establishment, as keeper of the light-house and revenue or custom-house officer for this collection district. I have it therefore in my power to speak correctly, as to the climate, the lands in the neighborhood, and their fitness for the propagation of the silkworm, the rearing of the Mulberry trees, and the manufacture of silk.

My present residence is on an island, near Cape Florida, distant six miles from the main. The soil is altogether sand and gravel, on which no vegetable can be raised.* My family, amounting to near twenty, have for the last eleven years been altogether strangers to fevers, or disease of any kind; indeed, I may with truth assure you that there is no spot in America, where a settler can with more certainty calculate on the enjoyment of uninterrupted health, than at this place, and the

* The next paragraph shows that the writer means the *smaller* vegetables, and not *trees*.—Ed. Far Reg.

immediate neighborhood. During the period mentioned (say since 1825) I have never seen a frost on this island. I have around my dwelling near twenty mulberry trees, which have grown to a large size. I have also several young trees of the *morus multicaulis*, which appear so little affected by the winter that they do not even cast their leaves. I have on the main, immediately opposite this place, a farm on which I have collected a number of tropical fruit trees. There are now on it 1000 banana, and about 500 plantain trees, in full bearing; and with the exception of the winter of 1834, they have never been affected by the cold. At this place the *morus multicaulis* has been planted, and thrives well; and I will venture to assert that their growth has been far more rapid than it would have been in a more northern situation. As a proof of this, allow me to state, that on the 23d of December last, I cut off six small limbs or twigs, from a tree of the *multicaulis;* they were stuck into the ground, and were not again seen by any one, until last week. I then found, notwithstanding the lateness of the season, that they had taken root, and had become thriving little shrubs and full of leaves.

I have thought it necessary to enter into these details for the purpose of bringing the question fairly before you, and by this means submitting it to the consideration of those men at the north, who are disposed to enter into the manufacture of silk, whether it cannot be attempted with more certainty of success at Cape Florida than in any other part of the United States. I am myself disposed to enter into the business, and would willingly join any gentleman possessed of a small capital. My lands and fences are now in a situation to receive the trees for planting. I have only one doubt on the subject, and I will candidly state it. I have never been able to obtain any of the eggs of the silkworm, and therefore cannot determine myself whether the moschetoes, which swarm here from the first of May to the first of November, will or will not kill the worms. Our trees and shrubs during the summer are covered with small worms: on these the moscheto has no effect; and I am disposed to believe that sufficient precautions could be used for their preservation. It will afford me pleasure to give all the information in my power to any one feeling an interest in the subject.—Letters directed as below will be attended to.

In conclusion, allow me to inquire, if the citizens of the north can with any prospect of success embark in the manufacture of silk, and in a country where the worms cannot live or be propagated for more than four months, how much more profitable would it be at Cape Florida, where the winters are sufficiently mild to allow the trees to retain their leaves through the year, and when the worms would be raised every month in the year.

If you can do it I should be glad if you would send me a few of the eggs as a trial.

Very respectfully, sir,

Your most obedient servant,

JOHN DUBOSE.

From the New England Farmer.

TO FATTEN FOWLS OR CHICKENS IN FOUR OR FIVE DAYS.

Set rice over the fire with skimmed milk, only as much as will serve one day. Let it boil till the rice is quite swelled out; you may add a teaspoonful or two of sugar, but it will do well without. Feed them three times a day, in common pans, giving them only as much as will quite fill them at once. When you boil fresh, let the pans be set in water, that no sourness may be conveyed to the fowls, as that prevents them from fattening. Give them clean water, or the milk of rice, to drink; but the less wet the latter is when perfectly soaked the better. By this method the flesh will have a clear whiteness which no other food gives; and when it is considered how far a pound of rice will go, and how much time is saved by this mode, it will be found to be cheap.

THE BEE MARTIN AND HAWKS.

Extract from the Genesee Farmer.

There is another class of birds, such as the Martin and Kingbird, which have been generally placed among the depredators, and warred upon accordingly. The complaint against these is not that they destroy the corn, or infest the grain fields or fruit orchards of the farmer, but that they destroy the honey bee. It has been the opinion of some writers on natural history, that this was not the fact; they have believed that the kingbird, [bee martin] for instance, fed only on the drone; but since the subject was agitated in the Farmer a year or two since, by Thomas and Allen, we have shot some for the purpose of examination, and found that, though the contents of the stomach mostly consisted of the large ox and horse fly, and the drone, there was now and then a real working bee that had fallen a prey like the others. This fact however has not satisfied us that he should be proscribed; on the contrary, we think these birds do far more good than hurt, and are worthy of protection. So far as we are concerned, they are welcome to now and then a working bee, so long as they will make such havoc among the drones and the ox or horse fly; and we are always glad when we see the kingbird constructing his nest on the premises, considering it a proof that no hawk will be allowed to forage around the barn-yard with impunity.

Although as a farmer we have placed a black mark on the hawk family, we consider the scale of good and evil nearly balanced in their case; and think that the loss of a stragling chicken now and then is nearly or quite compensated by the slaughter of some scores of weazels, snakes, and mice, in the course of the year. We accordingly treat the hawk on the let-us-alone principle, rarely putting ourselves much out of the way to kill them, so long as they pursue their legitimate way of getting a living, and do not become intrusive.

IMPROVEMENT OF WORN LAND.

To the Editor of the Farmers' Register.

I submitted some reflections on the improvement of worn land some time since, with the determination that I would persevere in the attempt to improve my own farm, one of the first settled in my county.

I have advanced, as I said I would, step by step. The thin land, such as would produce not more than a barrel of corn to the thousand hills, I have been manuring for tobacco, and last year made a

respectable crop on such land. It is a soft free land, and susceptible of improvement. At the fall, the land was sown in wheat, and in February, in clover; the crop of wheat is good and the clover very promising.

A piece of land adjacent managed in the same way the year before, a part of which was very much exhausted, has produced an excellent crop of clover, much mixed with herd's grass, (the product of seeds brought in manure from the stable.)

I am now perfectly satisfied that our exhausted lands may be restored to their original fertility; and so confident I am in the success of the undertaking, that it is a matter of choice to pitch a part of my tobacco crop in such land every year. Indeed, if we were to change our system, and cultivate all of our highly manured tobacco lots in grain and grass, we should do what is but sheer justice to our native land. Tobacco mainly killed the soil, and tobacco is justly chargeable with the expense of restoring it.

The improvement of land for corn to much extent, is not to be expected in the present circumstances of the country. Tobacco is the staple crop, and all the manure that can be raised is in requisition for the tobacco land. Now, if the thinner land is manured, and cultivated in tobacco, I feel no hesitation in saying (preposterous as the advocates for manuring the richer lands may think it,) the product will be in favor of the poorer land. The tobacco will be respectable, the wheat, and clover following, luxuriant, and the land raised in value 200 per cent.

The manuring of such land should commence early in the fall, covering the land with leaves, or such litter as can be conveniently had, in addition to which, the stable or farm-pen manure is indispensable. The first manuring will then be effectual, putting the land in heart for what is to follow.

In these remarks, I wish not to be understood as recommending the improvement and cultivation of the most exhausted land, to the neglect of a better subject for improvement. Any lands that are turfed and would produce more than a barrel to the thousand hills, would certainly be preferable, requiring less manure. The opinion is fast gaining ground, that lands that have long been abandoned as commons, and grown up in pines, &c. if taken up and judiciously managed, produce the finest tobacco. The reason is obvious; these lands were originally the richest; our fathers cleared their best lands first, and as in all new countries, supposed they could not injure them by cultivation. The same system is progressing in Mississippi, and the same result may be expected.

Several of my neighbors have tobacco in lands that produced little or no corn when last cultivated; the lands have been manured by no means heavily, and from present prospects, the tobacco promises to be good. They covered the land with leaves in the fall and winter.

The improvement of land will advance with the facilities of intercourse; roads, canals and the navigation of the rivers, are now receiving more attention. The public highways are under the management of the county courts, and to improve them systematically, the Legislature has wisely thrown the responsibility on each county to make such improvements on such roads as they may think proper. May we hope they will use the power granted for the good of the Commonwealth? Will the people shrink from a public duty wisely imposed on all males of sixteen, and under sixty? I cannot think they will.

Virginia presents a wide field for all the improvements of the day. It is a dear land to all her sons. The traveller to the distant west, can tell his own feelings best, when after a long and wearisome journey he enters on the Old Dominion: his Virginia feelings are awakened, his attachment is renewed, and all his speculations become insignificant, when he thinks of having to leave his native land; but restless spirits must and will go—"there is much land to possess," the land was made to be peopled, and so let it be.

But to the question—What is gained by removal to the west? A man who has a large and expensive family, desiring to settle his children, may, for the sake of them, meet the sacrifice of the conveniences of an older country, his own comfort, and go. But can he look at the expense of building such houses as he will leave, and clearing the heavily timbered lands of the west, and not see that the same amount expended in improving a good old Virginia estate would be as profitable? It is estimated to cost about $10 to clear an acre of land in the west; add to this the lowest price per acre, $1 25, and then erect such houses as a permanent settlement requires, and you have the cost of a western estate.

Has it occurred to many readers of the Register, that it is about as easy to improve an acre of land as to clear one? The felling of timber, grubbing the undergrowth, mauling rails to fence the land, the coultering and putting in order new land for a crop, consumes more time than to litter the same quantity with such means as may be had on most farms. *It is worthy of experiment.*

The friends of agriculture have much to encourage them; they should renew their diligence and utterly disregard the sneers of those who ridicule all improvement. The grand canal of New York, with the able Clinton at the helm, was considered a most preposterous undertaking. Clinton was driven from the distinguished station of Commissioner, but the work went on, was accomplished, and serves as a monument to perpetuate the fame of its projector. Yes, a more durable monument than the pyramids of Egypt, or such an one as is proposed to honor the immortal Washington; a structure to look on, rather than to answer any useful end, more to signalize the folly of the people, than to honor him who has all honor, who will live forever in the memory of a grateful people, without the adventitious aid of a sculptor or painter.

A system of improvement simple and practical, the community demands; and if, sir, the Register should be the instrument of setting in motion, (as I believe it will,) the real improvement of this once fertile Old Dominion, the state will remember the efforts on your part to accomplish the end in view.

S. D. M.

MINERAL MANURES.

[Continued from page 249.]

Application of marl.

Many farmers either lay marl upon land sown with tares, thus making a bastard fallow; or they apply it to grass land, or to a clover ley, to be bro-

ken up in the following year. The latter is certainly the preferable, as well as the most general practice, for it not alone produces an abundance of good pasture, but it affords time for the season to operate in bringing the marl into a fit state for future tillage crops, which cannot be done in the common course of cropping, because it becomes buried by the plough before it is properly mixed with the soil, especially if turned in deep the first earth. It should, therefore, be allowed sufficient time to sink, and eat itself into the the surface, before it is ploughed up. This, however, is by some persons carried to an absurd length, as they occasionally spread a coat of marl upon the green sward, and leave it there unploughed for many years, in which case the grass receives considerable detriment, for the marl then sinks downwards in a body, without incorporating with the soil; though, when it has lain a long time in this state, the subsequent crops of corn have been found to be enormous*. If laid upon grass, it may be carried out during all periods of the year in which the crop is not in a forward state of growth; but if applied to arable land intended for immediate cultivation, the months of June and July, or soon after the autumn seed-time, are considered the best for its application. If laid on a short time previous to winter, its effect is also generally prompt, because, except it be of a very tenacious kind, the action of the cold and rain commonly divide it in time, to be thoroughly amalgamated with the soil by the tillage of a summer fallow. If however, it be only applied during the spring months, this cannot be so properly carried into execution, for it requires the winter's rain and frost to crumble it, and it consequently has but little power upon the year's crop. A complete summer fallow is, undoubtedly, the best mode of bringing it into perfect operation: but not only is the expense often objected to, but there is also a strong prejudice entertained by many persons against fallowing—into which it is not our present object to inquire, although we necessarily shall have occasion to notice it hereafter.

It is almost superfluous to add, that, in whatever manner it be applied, it must be equally spread over the land; and if there should be any large lumps remaining, these should be broken with mallets, or clotting-beetles, in the same manner as chalk, before it is ploughed in. This, however, is not usually done until the marl has partaken of both one summer's sun and one winter's frost; and should the previous season have proved unfavourable to the reduction of the marl to small particles, the process, in some cases, costs so much, that, when laid upon grass or clover, it is often found more advisable to leave the ground unbroken during another year. Then, when well crumbled, dry weather should be chosen for rolling and harrowing it—a first time with heavy rollers and drags, and a second, after it has been exposed to rain, and has been again dried: in short, until it has been rendered as small as possible; after which it should be lightly ploughed in, again harrowed, and receive from two to four ploughings, according to the condition of the soil. The intermixture of the marl with the earth cannot, in fact, be too complete; for whatever proportion remains uncombined with the soil, will not alone fail of producing the intended effect, but will have one of an opposite and prejudiclal tendency.

The *quantity of marl* which it may be prudent to apply to the land depends entirely on the nature of the soil, and the properties of the marl: the more calcareous is the latter, the greater is the effect which it will produce, as a stimulant; and shell marl possesses, besides, the additional power of nourishing the soil by the vegetable and animal mould with which it is combined. This species was formerly profusely used on every sort of ground, but at present the average amount applied to land of the medium kind is from 30 to 40, or, if it be very light, only 25 cartloads, of 16 cubic feet per acre. Land of the latter quality may, indeed, be readily over marled; as by repeated marling, in large quantities, the surface of poor ground may be rendered so loose that, in some cases, it has not afforded a sufficient hold to the roots of corn and grass*. Double the quantity may, however, be laid upon strong cohesive soils, for it is not so easy to give them too large a dose; but if cold, wet, or moorish, great circumspection is requisite in the application of this marl, for if the land be not previously well drained, it will only increase its tenacity.

The earthy marls, if much mixed with clay, are only fit for light soils; and, if applied to them, the quantity must be increased in proportion to the deficiency of calcareous matter. When of good quality, containing about 20 to 25 per cent. of calcareous or chalky substance, they are commonly laid upon such land to the thickness of an inch; which will require 135 cubic yards, or about 200 single-horse cart-loads per acre†. sandy marl. though generally more calcareous; yet being dug up with less labour, is often used upon clays with greater freedom; and we have already seen the great extent to which stony marl is sometimes applied‡. In many parts, however; where the effects of marl have been extensively experienced, these quantities have been diminished one-half, with nearly, if not entirely, the same immediate effect upon the crops, though its power has been less durable, and has in most cases altogether ceased at the end of at most a dozen years; but, then, it admits of the following advantages—a farmer may be able to afford half the expense, when the whole amount may be beyond his means; or, at the same time, he can marl double the extent of land, and he can reap all the probable benefit within the term of a moderate lease. Nor is this all; for, supposing him to have the freehold—it has been found, that when large quantities of

* Dickson's Original Report of Lancashire, Stevenson's edit., p. 490

* Perth Report; and Appendix to that of Cheshire, No. 3.

† Clay-marl is not uncommonly laid upon light soils to the extent of two roods, each containing 64 cubic yards; but on heavy land, half that quantity per acre is considered a good covering.—Cheshire Report, p. 222.

‡ See p. 308. Throughout many parts of Scotland it is applied at the rate of 200 to 300 small cart-loads per Scotch acre,—equal to 160 to 240 per imperial acre. It is there commonly applied to grass land, and allowed to remain one or more winters on the surface, until completely reduced by the frost.—Survey of Morayshire, pp. 21-320; Forfarshire, p. 407.

marl have been laid upon the land, though its effects last longer, yet, unless cultivation be carried on with great intelligence and care, these are at length worn out, and by severe cropping to repay the expense, large tracts of marled land have been much exhausted. In such cases, too, a second application has been attended with very little benefit; whereas, when it has been laid on in moderate quantities, a second and further applications have been successful; the reason of which evidently is, that, in the first instance, the fertility of the mould was either exhausted by the chemical effect of the marl, or that, the soil being of a heavy kind, and the marl containing too great a proportion of clay, this addition became injurious; while, in the second, dung had been applied in aid of the marl, or, its earthy properties being of a nature opposed to those of the soil, assisted in its amelioration. The latter of which suppositions is, indeed, supported by the fact, that when a second application of clay-marl has failed, lime has been laid upon the same land with sensibly good effects*.

It has also been observed, in those places where marl is applied to the land in small quantities at stated distances of time, and where a sufficiency of dung is likewise used, that when weeds of any peculiar species push forward with extraordinary vigor, marl, if accompanied by a clean fallow, not only destroys them, but produces better corn than when dung has been laid on alone, though also upon a fallow, and instead of marl; which has been thought to be accounted for by the exuberance of the weeds proving that the soil is already abundantly furnished with nutritive matter for the promotion of vegetation, but that it is more appropriate to the production of the weed with which the ground is covered, than to cereal crops: whence it has been inferred, that the chemical action of the marl probably changes the nature of the mould.†

The *durability of the effects of marl* necessarily depends upon its power over the soil. A very large dose of argilaceous, or clayey marl, ameliorates sandy soils to such a sensible degree by the consistence which it affords to the land, that, if proper attention be paid to its complete combination with the surface, and to the prevention, by careful culture, of its sinking to the subsoil, as well as to the employment of putrescent manure, the improvement thus effected will be found permanent. When laid on in smaller quantities, its effect and duration will, on those light soils, of course, be proportionate; but on clays, as its chief power consists in the calcareous matter which it contains, its greatest effect is apparent when the land is brought into the second course of tillage, after which it gradually begins to decline, and after six or eight crops have been grown, it usually ceases to operate. No rule can therefore be laid down for its value among tenants upon a change in the occupation of the land, and it can only be estimated by the opinion generally prevalent throughout those parts of the country where it is used.

It is extensively employed throughout Cheshire, Lancashire, Shropshire, Staffordshire, and most of the midland counties, in almost every part of which it is found, but in the greatest abundance where the prevailing soil is a clay, or a clayey loam. It is there generally red, dark brown, or bluish-gray, intersected with veins of light yellow, of a greasy touch when moist, and friable when dry: the land where this species of marl forms the subsoil is likewise very commonly found to be of first-rate quality. There is also an excellent kind of marl sometimes met with, which is vulgarly called *dove-dung*, from resembling that of pigeons. Under sandy or mixed soils it is also very frequently met with, but usually at a more considerable depth. It is sometimes laid on the green sward in winter; and after being acted upon by the frost, is ploughed in the following spring, usually for oats. If, however, allowed to lie for twelve or eighteen months, it will have a still better effect; for the successive changes of the atmosphere moulder it down, and the roots of the grass combine it with the surface of the ground, by which means it becomes more beneficial to the following crop than if stirred immediately by the tillage of a fallow*. Marling on fallows is, however, practised to a very considerable extent, and is there found generally productive of great benefit to the soil. It is spread, immediately after being carted, upon the land, but its pulverization is left almost entirely to the atmosphere. Some kinds are much more easily reducible to a powdery state than others, and the difference determines, in many instances, the propriety of their respective application. On the stiff clay lands, or where immediate crops are the direct object of marling, those marls which pulverize with the greatest rapidity on exposure to the weather contain the largest portion of calcareous matter, and are, therefore, found the most beneficial. On light sandy soil, or where marl is employed with a view of producing durable effects, the more tenacious kinds may also be used with even greater advantage. Under the latter mode of application, the effects produced on the soil are not, indeed, evident until after repeated ploughings, and they frequently continue to manifest themselves during a long period.†

There is, however, a bad sort of red clay-marl, as well as a kind of brown shining clay, sometimes mistaken by farmers for marl, which, having been dug out of almost every field, and laid during many ages on some heavy soils, has increased their tenacity, and rendered them less fit for the purposes of agriculture. Its effects are, indeed, so apparently unfavorable, that its further use has been prohibited to the tenantry on the estates of the Duke of Sutherland, in Staffordshire and Salop, and a distinct line in the appearance of the crops now points out with precision the land which was formerly so treated. Of this fact all the intelligent part of the tenantry are themselves convinced, though some are still so wedded to their old customs, that they lament the regulation which excludes its use‡.

Marl is, also, generally used in Norfolk, in which

* Berwickshire report. Naismith, on Manures Gen. Report of Scotland; App. vol. ii. p 75.

† Thaer, Principes Raisonnes d'Agriculture, 2de ed. tom xi. p. 415.

* Arthur Young's Essay on Manures, in the Papers of the Bath and West of England Society, vol. x., p. 106,

† Holland's Survey of Cheshire, p. 233.

‡ Loch's Account of the Improvements on the Estates of the Marquis of Stafford (now Duke of Sutherland), p. 190.

county it is found of better quality, and of easier access, than in most other parts of the kingdom. By Mr. Blaikie, it is described as having a hard, dry, and slaty appearance, when first dug from the pit, and possessing about the same proportion of lime as the Norfolk clay, which contains a large proportion of calcareous earth; the only difference between them seeming to consist in the one being a little more friable than the other; so that they are very commonly confounded,—'one practical man calling that substance clay, which another, equally conversant in such matters, terms marl*.' By other persons, another species is mentioned as a white, pure, calcareous substance, like chalk, though sometimes streaked with yellow, but fat and unctuous. When found of any other color, it is, indeed, said that farmers can scarcely be persuaded that it is marl; but although this kind possesses greater purity than the former, yet there are many other sorts of very strong quality. On its first discovery it was seldom laid upon the land at a less rate than from 80 to 100 loads, each containing as much as a wagon with three horses could draw, and its effects were found to last, on some soils, full twenty years. This system has, however, been latterly corrected, and the quantity now laid upon the land does not usually exceed 40 to 50 tons per acre. It imparts tenacity to the soil, and where that is composed of a mixture of sand and loam, or of sand and gravel, it causes great improvement; but on land of so loose a texture as to consist almost wholly of sand, it has been found, in the course of years, to form a retentive subsoil, which has proved injurious. It has, indeed, been shown, in some instances, that on land of the latter description, clay has had a better effect.

In the earliest stages of improvement in the Norfolk husbandry, some farmers, from experiencing the evils of a want of firmness in their poor sands, marled at the rate of 120 to 150 cubical yards per acre; the consequence of which was what they call *setting:* the firmness was produced, but at the expense of the friability of the soil, which was thus rendered too tenacious, so that it is at present found preferable to give a moderate dose at first, and to repeat it at a future period. This prejudicial effect, arising from marl, is very remarkable; for the clay, sand, and lime of which it is composed would not, if thrown promiscuously over a field, produce the same effects; and when laid upon the land, they indicate no improper proportions, nor any which are not found in very rich soils. It may, therefore, contain other ingredients which have not yet been detected by chemists; and, as has been imagined—perhaps not unjustly—by Arthur Young, 'it arises from the addition not being so well assimilated with the sand, as in soils of a natural texture it is rather a mixture than an incorporation.'† There is, indeed, reason to suppose that marl derives much of its beneficial qualities, as a manure, rather from the complete amalgamation of the various substances of which it is composed, than from any other cause.

Mr. Marshall, in his Rural Economy of Norfolk, enters into a chemical investigation of the nature of the marls, which, though too long for insertion here, is well worthy of attention; in which he describes that of the white, or rather yellow kind, as one of the best and most lasting species of fossil manures. Twelve cart-loads—according to his account—change the nature of the land in the second year after it is laid on; and most of the exhausting weeds which impoverish the soil, and choke the corn in its infancy, being effectually destroyed, it consequently has a great tendency to keep the land clean; also bracing the pores of the earth, and increasing its fertility to a surprising degree. Its benefits, he says, are felt throughout full thirty years; when a second marling of about half the original quantity may with propriety be used; but it has been found, by experience, that it does better the second time, if applied as a compost with earth of a sort different from that of the soil on which it is laid; or with mud, and more especially with dung. To this it may also be observed, that lime is not unfrequently added; though, as lime and marl both partake of the same properties, the mixture of the former only has the effect of strengthening the compound.

It thus appears that not only do the species of marl vary in several parts of the kingdom, but in some parts there are kinds which, though seemingly quite distinct from each other, have yet been found, on trial, to possess precisely similar qualities; for we learn that experiments on a considerable scale have been tried in the New Forest, in Hampshire, on three different sorts, dug out of the same pit, namely,—yellow, at about four feet below the surface, blue in the middle, and shelly-marl underneath; and yet, although from all the accounts which have been received of the latter, its properties are superior to those of the two former, still, in these instances, no other difference was observable in the crops during many years, except that the shell-marl rendered the land rather the most friable*.

That marl materially benefits land on which it is judiciously used, admits of no kind of doubt. Much difference of opinion is, however entertained respecting the manner in which it operates—most farmers conceiving that its only value consists in the calcareous matter with which it is combined; others, that its principal advantage arises from the bulk and consistency which it imparts to the ground; and some, that the improvement which it occasions is chiefly owing to its mechanical action on the texture of the soil. Upon an attentive consideration of the subject, it will, however, appear, that a certain portion of its utility as a manure is derived from each of the three sources which have been assigned. With regard to the calcareous earth of which it is partly composed, it clearly possesses, in extent equal to the proportion which it contains of that substance, the same power that would be produced by the direct application of a similar quantity of lime. It is however, apparent that some descriptions of marl, though advantageously employed on most soils, do not contain any, or only a ve-

* Treatise on Mildew, 2d edit. p. 26. 'The substance called clay, in many other districts, contains a larger proportion of alumen, or clay proper, with a very limited quantity of lime, and is, consequently, not adapted for husbandry purposes; at least, not upon tenacious soils.'

† Papers of the Bath Agricultural Society, vol. x. p. 108.

* Communications to the Board of Agriculture, vol. vi., art. 3.

ry small portion of the carbonate of lime; its efficacy therefore cannot be solely attributable to that cause*, and it must possess some other property from which its influence upon the land is partly derived. This may consist either in the change which its application produces in the texture of the ground through the mere increase of its bulk, which, by its dense and unctuous quality, also adds to the consistence and value of all light soils; or, by the more perfect combination of the particles of which it is formed, by which its powers are brought into full action, and lime, sand, and clay are each made to bear against each other, and thus aid its mechanical operation on the land. All marl, except those species which are combined with large portions of iron, sulphur, or deleterious mineral substances, also of itself affords nourishment to corn and vegetables; it must, therefore, be considered as a soil, and when laid upon the land, this addition must necessarily yield a more abundant support to succeeding crops.

If this view of the subject be correct, it may be assumed, that all kinds of marl which abound in calcareous matter may be considered applicable to every soil to which lime is beneficial; subject, however, to the effect which may be also produced by the other portions of their substance when applied to land of a peculiar nature. Thus—as we have already more fully stated in the preceding part of our observations—on light, sandy, and gravelly soils, an advantage is gained by the large quantity of clay which the marl appropriate to such land usually contains, by rendering them more stiff and impervious to the rain, and therefore stronger: on wet and heavy lands, on the contrary, as it renders the soil more retentive, unless very great care be bestowed on their drainage, it may occasion permanent injury; but shell and stone-marl occasion it to become loose and friable. Attention should therefore be paid, not only to the nature of the marl, but to that also of the soil to which it is to be applied; and when a choice of marl can be procured, its earthy portion should differ as widely as possible from that of the ground upon which it is intended to be laid.

In fine, marl may be considered as an improver of the soil under so many different circumstances, that it can hardly be recommended in too strong terms; for if it be used with judgment, it adds staple to the soil, improves its quality, and renders the application of putrescent manure more effectual. The use which some farmers make of it, however, deserves the highest censure,—'many of them taking repeated crops of oats in the interval of one summer-fallow for wheat, by way of cleansing the land; after which, barley and oats again, as long as the land will produce anything, until it is at last laid down with weeds and couch-grass. Such is the view taken of their conduct by the surveyor of Lancashire, where it is very extensively employed, and in which opinion he is by no means singular. The rotation which he recommends—with reference, of course, to land that is not too strong—is to take one crop of oats the spring subsequent to marling; plough the stubble immediately, in order to expose the marl again to the influence of the frost; fallow, with manure, for turnips—a crop which, under this management, is never known to fail; then barley, clover, wheat, turnips fed off with sheep, and barley again, with well-dressed hay seeds, and white clover and trefoil for a perennial ley, or at least for some years*. Under which management, poor land may, when properly tilled and duly supplied with putrescent manure, be rendered highly exuberant without being in the least degree harassed.

Analysis of Marl.

The value of marl, as a manure, must of course be referable to the nature of the different kinds employed. It is, indeed, evident that, being intended to correct or improve the soil, its constituent parts should be known, and their qualities explained, before any use can be rationally made of it; and, therefore, the more accurately its properties are ascertained, the more confidently may the propriety of its application be determined. Farmers, indeed, cannot be expected to be sufficiently acquainted with chemistry to be able to analyze it, though the most calcareous sorts may be known by means of acids, as applied to lime; or, the common earthy kind, when put into water, will fall to pieces, allowing a considerable portion of sand to fall to the bottom of the vessel: by which simple tests, they might often derive considerable advantage. Its qualities are, however, more generally taken, by mere practical men, more upon trust derived from the experience of their neighbors than from any actual knowledge of its properties; but although, when thus guided, they cannot go far wrong, yet they may be misled by circumstances of slight apparent difference, and, in cases of new pits being opened, no certain estimate of its effect can be formed until a complete analysis has been made. This should, indeed, be done in all such instances; for it costs but a trifle, is easily performed, and without having recourse for the purpose to a regular scientific chemist, the object may be attained by application to any intelligent apothecary, by furnishing him with the following account of the modes of procedure:—

The ingredient of marls, on which their fitness for agricultural purposes depends, is the carbonate of lime. It is owing to the presence of this earth that marls effervesce on the addition of acids, which is one of their distinguishing characters: to ascertain which—

'Let the marl be put into a glass partly filled with water, which will expel a portion of air contained mechanically in the marl, and thus obviate one source of fallacy. When the marl is thoroughly penetrated by the water, add a little muriatic acid, or spirit of salt. If a discharge of air should ensue, the marly nature of the earth will be sufficiently established.'

Then, to find their composition—

'Pour a few ounces of diluted muriatic acid into a Florence flask, place them in a scale, and let them be balanced. Then reduce a few ounces of dried marl into powder, and let this powder be

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* Out of twelve specimens of marl submitted to the inspection of Sir Humphry Davy, eleven were found to contain calcareous earth in various proportions; but the result of many other trials of marls, procured from different parts of the country, and found by farmers to produce an ameliorating effect upon the land, yet proves them to be, in many instances, wholly deficient in that substance. See the section on 'Marl,' in Holland's Survey of Cheshire.

* Dickson's Lancashire, Stevenson's edit., p. 491.

carefully and gradually thrown into the flask, until, after repeated additions, no further effervescence is perceived. Let the remainder of the powdered marl be weighed, by which the quantity projected will be known. Let the balance be then restored. The difference of weight between the quantity projected, and that requisite to restore the balance, will show the weight of the air lost during the effervescence, and will stand thus,—

'If the loss amount to 13 *per cent.* of the quantity of marl projected, or from 13 to 32 *per cent.*, the marl assayed is calcareous marl, or rich calcareous earth.

'Clayey marls, or those in which the argillaceous ingredient prevails, lose only 8 or 10 *per cent.* of their weight by this treatment; and sandy marls about the same proportion. The presence of much argillaceous earth may be judged by drying the marl, after being washed with spirit of salt, when it will harden, and form a brick*.

From the New York Farmer.

ELECTRICAL SHOCK FROM A SHEET OF PAPER.

Place an iron japanned tea tray on a dry, clean beaker-glass, then take a sheet of foolscap writing-paper, and hold it close to the fire until all its hydrometric moisture is dissipated, but not so as to scorch it; in this state it is one of the finest electrics we have. Hold one end down on a table with the finger and thumb, and give it about a dozen strokes with a large piece of India rubber from the left to the right, beginning at the top. Now take it up by two of the corners and bring it over the tray, and it will fall down on it like a stone; if one finger be now brought under the tray, a sensible shock will be felt. Now lay a needle on the tray with its point projecting outwards, remove the paper, and a star sign of the negative electricity will be seen; return the paper, and the positive brush will appear. In fact it forms a very good extemporaneous electrophorus, which will give a spark an inch long, and strong enough to set fire to some combustible bodies, and to exhibit all the electric phenomena not requiring coated surfaces. If four beaker-glasses are placed on the floor, and a book laid on them, a person may stand on them insulated; if he then holds the tray vertically, the paper will adhere strongly to it, and sparks may be drawn from any part of his body, or he may draw sparks from any other person, as the case may be; or he may set fire to some inflammable bodies by touching them with a piece of ice.

I beg to remain,
Yours, &c.

G. DAKIN.

Oxford, March 20, 1836.

From the Cultivator.

DIFFERENT KINDS AND QUALITIES OF THE MULBERRY.

No little confusion and perplexity prevails as to the distinctive names and synonymes of the different kinds of the mulberry, and as to the relative qualities of each for producing silk. The kind specifically known as *multicaulis*, has been equally well known under the synonyme of *Chinese*. Seed has been recently vended in our market, as Chinese, at the enormous price of $5 the ounce, declared not to be the multicaulis, and believed not to be a species ever grown in China. The red of America has been confounded with the black of Europe. We hear of the Dandolo, Italian, Brussa and Constantinopolitana; and of the rough, dwarf and Pennsylvanian—the first four of which, we suspect, are identical, and the latter perhaps only varieties of the red, as neither Beck nor Eaton make mention of any American species but the red. Yet we have had forwarded to us, by a friend, three impressions of mulberry leaves, said to be indigenous, growing wild in Ulster, which seem not to belong to any of popular species, and two of which, at least, appear to be dissimilar. Upon these, our correspondent successfully fed the silkworm. Two of these leaves are 10½ inches long and 8 broad, the other is 8 inches long and broad; and we are told of indigenous kinds bearing both red and white fruit. If our friends will furnish us seeds of indigenous kinds, other than the red, they will confer on us a favor, and perhaps do a public benefit.

In the mean time, though we cannot promise to clear up the matter, we will endeavor to throw upon it all the light in our power.

We will in the first place, show, from three modern authorities, all the species of the mulberry which have been described. Kenrick, an American authority, names five species, viz:—

Botanic name.	*Common name.*	*Native of*
1. Morus Nigra, - -	Black, -	Asia Minor.
2. Do. Rubra, - - -	Red, - -	N. America.
3. Do. Alba, - - -	White, -	China.
4. Do. Moretti, - -	Dandolo, -	Italy.
5. Do. Multicaulis, -	Many stalked,	China.

Loudon is silent as to No. 4, gives Italy as the native country of the black, and adds:

6. Morus Tartarica, -	Tartarian, -	Tartary.
7. Do. Tinctoria, - -	Fustic wood,	West Indies.

And Sweet adds to the list:

8. Morus Italica, - -	Italian, -	Italy.
9. Do. Constantinopolitana,	Constantinople,	Constantinople.
10. Do. Scabra, - -	Rough, -	N. America.
11. Do. Pennsylvanica, -	Pennsylvanian,	do.
12. Do. Pumula, - -	Dwarf, -	do.
13. Do. Indica, - -	Indian, -	East Indies.
14. Do. Sinensis, - -	Chinese, -	China.
15. Do. Mauritiana, -	Mauritius, -	Mauritius.

The three last named are stove and green-house plants, and of course, too tender for our climate.

1. The black is peculiar to Europe and Asia, and does not, when introduced, stand well our northern winters. It seems from Gen. Tallmadge's letters, published in the Journal of the American Institute, that worms fed on the black mulberry make the strongest thread, and we are left to infer, that Italian sewing silk, which is of the hightest repute in the market, comes from this species of the mulberry. This is given on the authority of an extensive manufacturer of Italian sewing silk.

2. The red mulberry abounds in our woods, in several of the states, but it is a different species from the black of Europe. Good silk has been produced from the leaves of this tree, in Kentucky, Ohio, New York and Pennsylvania, and we have been presented with a beautiful fabric produced from it in the first named state. It is quite hardy.

3. The white is the common kind, well known

4. The Dandolo is a new species or vari

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* Henry's Elem. of Exper. Chem., vol. ii. chap. xv. sect. iii. See also Kirwan on Manures, p. 12.

discovered in Italy in 1815, of great promise, and is probably identical with the Italian of Sweet, (No. 8,) and possibly with those from Constantinople, &c. Its qualities for silk are not fully known; but we believe it to be more hardy than even the common white, if, as we suspect, we have a plant of it in our grounds.

5. The multicaulis, we are obliged to persist in saying, is too tender for our climate, north of 42°. We believe all attempts to cultivate it here, will end in disappointment. The white and the black suffice in the great silk countries of Europe. Gen. Tallmadge tells us, after he had traversed Italy and France, and made silk the subject of special observation and inquiry, that "we have more of the Chinese (multicaulis,) growing than France and Italy together;" and that though the silk from the multicaulis was finer and more delicate, it required more skilful and delicate work to wind and work it.

6. and 8. Of these we know very little, except the latter should be the Dandolo; and 7 is employed merely as a dye-wood.

9. We believe to be the same as the Brussa, which is cultivated in Asia Minor, and seeds of which have recently been introduced from Constantinople, by Mr. Rand. Great hopes are entertained that it will be found useful and hardy, though these hopes remain to be confirmed—the seed not having been sown, we believe, till 1834.

The next three named, (10, 11, 12,) which purport to be American species, are not recognized, as we have before observed, by American botanists; and yet we think that on examination, it will be found, that we have more than one indigenous species.

Having alluded to the letters of Gen. Tallmadge, we make from them the following extract, for the benefit of our silk growers:—

"Finizio is an extensive manufacturer of sewing silk; he makes about 3,000 pounds a week, which is mostly sent to the New York market. He is an intelligent man, and I found him willing to answer my inquiries; as also were several other establishments, and which mostly confirmed his statement. The sewing silks of Naples are mostly made from the silk grown in *Calabria*, where the worm is fed principally upon the *black* mulberry, and which makes the strongest and best for sewing silk. Finizio stated that the worm fed on the black mulberry made the strongest thread; *that* on the *white* mulberry, finer and better for fabrics; *that* on the Chinese mulberry still finer and more delicate. When asked if the cocoon from the Chinese mulberry required more skilful and delicate work to wind and work it, he said it did, and immediately produced two skeins, one of which he said was from the black mulberry (from a bush, perhaps, eight or ten feet in circumference,) the other from a bush about four feet. The lesser bush, he said, was less liable to break the thread in winding from the cocoon, and was used in finer silks for fabrics. The black mulberry produced a stronger thread, and would bear the larger reel, and was principally used in that business. The silk here is mostly made in the country by families in detail, and much of it reeled there, and in this condition it is brought to market. For sewing silk it is doubled as often as required, and twisted as much. This process is wholly in a *dark room*. The silk is worked wet, and for this purpose, to preserve a uniformity, the atmosphere is kept damp, the day-light excluded, and the work carried on with small hand lamps. The machine was turned by men harnessed like mules. I have since been out about twenty miles to the silk factory of the king, which is worked by water power, and by which the cocoons are also reeled. I stated to Finizio, as also the king's factory, that the Italian sewing silk was sold in the American markets by its weight, while the American sewing silk was sold by the skein; and that one pound of the Italian would have perhaps 250 skeins, while one of the American silk would have about 350 skeins. The cause of this difference of weight, or why the American sewing silk has a tendency to curl or knot, they could not explain without a sample, but said the weight of sewing silk could be diminished or very considerably augmented in the *dyeing*, and that good dyeing required the silk to be well *boiled* in *soap*, after which it was put into an acid, and was there prepared for the process of the dye, according to the color, as desired. The gloss, or dressing, seems to be produced by beating and twisting on a post, which, with the manual labor put upon its finish, it is supposed, prevents its tendency to knot.

"I asked if the color of the cocoon, yellow or white, gave any difference of value, or indicated a sickly worm, and the answer was that the color was casual, and the value the same; that a selection of white or yellow cocoons from which to get eggs would probably produce a like color; and Mr. Finizio, said he had some customers who had so selected and brought him *cocoons* entirely *white;* and that for white ribbands or fabrics, they commanded a greater price of from three to five per cent, though otherwise of equal value."

While on the subject of the mulberry, we will mention a new mode of propagating or growing it, related to us by a gentleman from Michigan. It is to lay the entire plant, while a seedling, in the furrow, lengthwise, at a proper distance, and to cover them with the plough. The plant sends up a number of shoots, and if left to grow, forms what is technically called a stool. We understood our informant to say, that he had eight acres growing in this way. The advantages which this mode promises, are, first, the plant is rapidly multiplied; second, the leaves are gathered with greater facility, from the dwarfish habits of the plant; and third, and we deem this a very important advantage, if the wood is killed by the winter, and this is sometimes the case, even in Michigan, and often here, the roots are preserved, the dead wood may be readily cut off with a bush hook, and new and vigorous shoots, spring up from the base. We believe this mode of growing might be profitably adopted in regard to the multicaulis.

From the Transactions of the Massachusetts Agricultural Society.

BEET ROOT SUGAR.

Roxbury, June 15, 1836.

The Hon. Thomas L. Winthrop,

Sir—Mr. Isnard put into my hands a few days since a memoir "On Indigenous Sugar, and the

Actual Situation of that industry in France, &c." It was published in the early part of this year in Paris, by M. de Dombasle. That gentleman was for many years concerned in a large establishment, for the manufacture of beet sugar, but he is now the Superintendent of the National Experimental Farm, which is a highly valuable appendage to the Royal Agricultural Society. He has long been well known, as one of the ablest writers, and most intelligent experimentalists, on rural affairs, of modern times; being equally as conspicuous for his practical illustrations, as for his great scientific attainments, in whatever relates to the advancement of the useful arts, and the tillage of his country.

I have made several extracts from his very interesting and instructive work, with the view of presenting, in a succinct manner, the progress which has been made, and is now making in Europe, in this important branch of industry.

It appears, that the manufacture of sugar, from the beet, was first attempted in Silesia, by Mr. Achard, in the early part of the present century, but was soon abandoned. In 1810 successful experiments were made in France, by MM. Andre and Isnard, which having been made known to the Emperor Napoleon, under the auspices of the radiant and mighty genius of Chaptal, he issued an imperial decree, for encouraging the manufacture, on a large scale, and establishments were commenced at the village of Point-a-Mousson in Lorraine, in 1811 and 1812. It is not a little remarkable that the first was erected under the superintendence of Mr. Isnard, and is still in full and successful operation, after a suspension of a year or two.

M. de Dombasle observes, "This industry, although so powerfully favored by the imperial government, seemed to expire with it; and it was not until 1820, that but very few people believed the manufacture of sugar from the beet, was anything more than a ridiculous attempt to achieve what was impracticable, and had been induced by the long and rigorous continental blockade, which had enhanced the price of sugar to 90 cts. per pound. Still the sparks of this industry were preserved in France; it has maintained its position amid moderate duties, which were imposed on foreign sugar, for the mere purpose of revenue. So that, in truth, it may be said, that it has prospered, not only without the aid of the government, but in spite of it; for nothing is more remarkable than the disdainful manner in which it was treated, until 1830, by the national administration. It appeared that the Bourbons could not forget the stigma of its imperial origin. At last the government has been compelled to notice its existence: for it has become so important, from the great results which have been produced, that it can no longer be disregarded. From the ten to twenty millions of pounds of sugar, which were brought into market, some five or six years since, the quantity which will be made this year, will amount to 60,000,000 of pounds."

"To judge properly of the importance of an industry, which has for its end the creation of a product, which has hitherto been furnished by our colonies—to appreciate the degree of encouragement, which it merits, on the part of those public men, whose province it is, to watch over the prosperity of their country, and to hasten the increase of national wealth, it is necessary to glance at the situation, in which France is now placed, with respect to her colonies. The present generation are the observers of a most grave and important spectacle. It is that presented by the fall of the gigantic colonial edifice, which the Europeans had reared in the new world. The English colonies of North America commenced the march of this grand trans-atlantic revolution; and France, herself, by aiding them in their separation from the mother country, laid the axe at the base of the colonial structure; for it was easy to foresee, that as soon as a single one of the American nations, broke the fragile bonds, which placed a whole country under the dependence of a government situated in another hemisphere, all the moral power of the colonial system was annihilated; and the *independence* of all the other colonies would soon be the inevitable consequence."

"The enfranchisement of all the people on the American continent has now been consummated. Can it be seriously believed, that a few Islands, situated in the vicinity of that continent, will long remain dependent upon the people of Europe. In the slave colonies, a very evident cause has tended to retain the people as dependent upon the parent country. There, no revolution was possible in favor of the whites, and if any occurred, it must be like that of St. Domingo. The colonists, therefore, dare not attempt any enfranchisement, in favor of themselves, in the West Indies, for their only reliance against a servile revolt and war, was on the parent country. But now the parent country has commenced the abolition of slavery, in those countries, and it is very certain, that the emancipation of the blacks, strikes a fatal blow to the cultivation of sugar, and will ultimately extinguish it. This is a truth, which no one can doubt; and it is highly probable, that if no accidental cause strips us of our West India colonies, we shall soon be obliged to forego their products of sugar; for it cannot be reasonably believed that France can long maintain slavery in her colonies, when the blacks are emancipated in the neighboring English Islands.

"It is under these circumstances, that Providence has offered us the means of replacing the richest product of our colonies, by a vegetable of our own country, and which at the same time introduces into our agriculture a plant, which favors its progress in an eminent degree, as it forms a most productive element for fattening cattle, and enriching the land."

M. de Dombasle, is of opinion, that in the British government, there was a profound priciple of political economy concealed under the apparent spirit of philanthrophy which sanctioned the abolition of slavery in the West Indies. That it had in view, the ultimate monopoly of the sugar trade of the world, as her East India colonies could supply the entire demand of Europe at least; and her policy has ever been to favor her vast oriental possessions, at the expense, and ultimate destruction, of the West India planters.

Mr. Isnard has submitted to my examination, some preliminary observations and calculations, on the establishment of a beet root sugar manufactory in this state. He has given the details of the expense and estimated net income, on a given capital, by which it appears that from 25 to 75 per cent. may be realized. I hope, some of our en-

terprising capitalists will be induced, to undertake the experiment; for that it must ultimately become one of our great branches of industry, scarcely admits of a doubt.

I do not know any subject so worthy of the consideration of the Massachusetts Agricultural Society, as this new culture. It will render our climate independent of the tropics, and introduce a great valuable staple for our farmers, which has been much required, to elevate them to the level of other more naturally favored portions of the union. We have no distinctive *crop*, to which our land owners can direct their attention as a constant and certain source of profit. Even Indian corn is not always to be relied upon, and our soil is not generally congenial to wheat. We are too far north to enter into the lucrative culture of tobacco and cotton, and are compelled to confine our labors to the rearing of an infinite variety of small articles, or to grazing. Butter, cheese, pork and beef are our chief products, which are raised at a vast expense, for our winters require such immense fields to furnish hay for the stock during that long protracted and rigorous season, that the farmer is precluded from acquiring a fortune, which he is so deservedly merits, from his arduous and patient industry, and for which all the other classes of society are emulously striving, and which they can, more certainly attain. By labor without end, it is true, the farmer can live comfortably, but seldom is it, that he reaches a more happy condition. This is to be lamented. In other states the owners of land are in the high road to affluence, and why should not a mighty effort be made to ameliorate the condition of the virtuous, hardy and intelligent husbandmen of New England.

The quantity of flour and cereal grains—as wheat, corn, rye, barley, and oats, annually imported from the middle, southern and western states is enormous, and is a sufficient commentary on our soil and climate, for the culture even of bread stuff; and we export, of agricultural products, but little. This discouraging aspect of our agriculture, has induced hundreds of thousands of our active and vigorous young men, to emigrate to other sections of the United States, where the soil and climate are less adverse to the hopes of the farmer. But if the culture of the sugar beet is successfully introduced, the ultimate benefits which will result, may be anticipated, from what has been accomplished in France, within the brief period of fifteen years. I confidently believe, that the culture of silk and the sugar beet will effect such a salutary chance, in the condition of the farmers, that they will present as much prosperity, independence of circumstances, and affluence, as the cultivators of the earth in any portion of the globe.

Germany, Prussia, and Russia, have recently entered, with zeal, into this favored branch of rural economy; and even England, where there has, hitherto, been such an indifference to the subject, if not amounting to contempt, I perceive, by the very last arrival from London, has at last awakened from her stupor, and a company was about being organized, under the name of the United Kingdom Beet Root Sugar Association, with a capital of 1,000,000 of dollars.

Mr. Isnard having first aided in introducing the manufacture of sugar from the beet, in France, and having kept himself constantly informed of the various improvements which have been made since, may well be confided in, as an able pioneer, for this industry in the United States.

In Philadelphia, efforts are being made, by a company, to commence the culture of the beet and to manufacture sugar in Pennsylvania. An agent has been sent to France to collect information; and from the measures which are in train there is very prospect of a favorable result.

From your long and meritorious services, as an officer of the Mass. Agricultural Society, and your known patriotic disposition to advance the best interest of your country, by all the possible means within your power, I am fully persuaded, that this very interesting subject will receive from you and your highly respectable and public spirited associates, all that consideration, countenance and encouragement, which it appears so pre-eminently to merit.

With sentiments of the highest respect,

Your most ob't serv't,

H. A. S. DEARBORN.

From the Mechanics' Magazine.

STEAM, *versus* WATER.

Few persons even in this age of inquiry and improvement seem to be aware of the vast superiority of steam over every other form of motive power. Many are still, by this assertion, reminded of the anecdote of the famous Brindley. In giving evidence before a Committee of the House of Commons on the subject of canals, he spoke of their superiority as a mode of communication in such decided terms, that a member asked for what he thought rivers were intended? he unhesitatingly replied, "*to feed canals.*" Now, though we say that the manufacturer will one day "feed his boiler from the falls," we think that the assertion is not a bold one, and that it does admit of proof.

Some time ago, our attention was directed to a comparison of the expense of the two forms of power in the village of Lowell, possessed of the best water power in the union. The expense of steam to water was said to be as 100 to 125.

We have since often had this subject in mind in reference to the more improved use of steam, and particularly to the economy of the rotary engine of Avery.

Pursuing the comparison, we have collected some of the more prominent disadvantages of the usual hydraulic system, and the corresponding advantage of steam power.

The first item of cost is that of the water-right, over and above the value of the ground as increased by any other advantages of locality. This expense is in no case trifling, and sometimes is positively enormous. There is, of course, no corresponding item of expenditure in the use of steam, an engine working as well on the top of a hill as in the bottom of a valley.

2d. The outlay upon wheels, dams, and other hydraulic works. This is often much greater than would be necessary for the average pressure, provided it were constant—that is, we are to erect works to support much more water than we have supplied through three quarters of the year. Freshets, &c. are to be provided against, at an increased cost. It is well known that in some loca-

tions the provision for such contingencies is no small portion of the whole capital employed.

It is this expense, other things being equal, that is to be compared with the cost of an engine, and the comparison is favorable to the latter.

3d. After every precaution, damages from floods are of constant occurrence, and their repair is exceedingly costly.

4th. The delay caused by freshets, &c., producing a stoppage from the too great supply of power.

5th. The delay in seasons of drought, when the supply is insufficient.

These last are most vexatious occurrences, preventing work often times when most is to be done, and the uncertainty arising from the possibility of such delays and accidents, is a constant care to the manager of such an establishment, whereas to the consumer of steam, the perfect certainty of the amount and regularity of the supply of power is a great auxiliary in conducting business.

For a steam engine, the only use of water is a sufficiency for the boiler; and in these days of economy of heat and steam, a very small quantity of fuel is used, and but little water. We have seen a rotary engine, estimated at 15 horse power, evaporating but 40 gallons per hour.

6th. Delay in winter, and in our uncertain climate this may sometimes be considerable, and in an establishment of great extent perhaps fatal.

To balance all these expenses, pecular to the use of hydraulic power, there is, as far as we can recollect, but one peculiar to that of steam, namely, *fuel.* Now in saw mills this expense is nothing, and in all instances much less than formerly.

Our persevering countryman, Dr. Nott. has already succeeded in greatly reducing this item of cost—and he does not yet appear to be satisfied.

As regards fuel, Avery's engine has immense advantages over others, inasmuch as the quantity of water used is less than in any other case. The elasticity of the steam operates more advantageously than in any other construction, the small quantity of water used being a proof of this.

In the engine above referred to, the cost for coal was rather less than $1 for ten hours.

It is almost needless to observe that, in many large establishments, manufacturies, &c., the application of a portion of the steam to heating, &c., nearly, if not quite, compensates the cost of fuel. The certainty and uniformity of this method of drying goods, have fully established its superiority. Indeed, in the art of dyeing, certain colors owe their brilliancy to the rapid and high heat of steam, and they could be produced in no other way. While speaking of this use of steam, we must notice an engine erected in the Astor Hotel. This is a small engine of 5 horse power; its use is to pump water from the different cisterns to all parts of the house—supply the baths with hot and cold water—clean knives—brush shoes—roast and grind coffee; and the steam cooks the various dishes in the kitchen, and also dries the clothes, which by this method of proceeding, are ready for use with unprecedented despatch. To these and numberless other uses is this engine turned, saving an immense number of servants, a great quantity of fuel, and a vast deal of time.

(The exhaust steam pipe of this engine is over 300 feet long.)

One of the greatest advantages of steam power, in many cases, is, that it admits of change of locality, without injury to the machinery, and often with benefit to the employer.

In this respect again Avery's engine stands pre-eminent. The machinery is beautifully compact, and consequently portable. An engine of 15 horse power is hardly a load for a horse, the whole weighing less than 600 pounds.

Let us suppose, that a man purchases a piece of timber land, of prime quality, but unfortunately (as is thought) away from any water course.

Let him procure an Avery's engine; and this, connected with his saw mill, can be placed upon wheels and moved, by the engine itself, if he pleases, to any part of his land. (Mills capable of such an arrangement, and very compact, are now easily to be procured.)

Let him locate his mill near a spring, and commence operations. The waste and rubbish, that in most cases is a drug, is entirely consumed by the engine; the ground is cleared, and nothing is to be removed but the perfectly formed timber.

Among other useful applications of such an engine, in the forest itself, no one can be equal in beauty of operation to the valuable *stave machine* of Philip Cornell, N. Y. This machine promises to be of great service. With such an arrangement as that of the saw mill above mentioned, nearly if not quite double the usual number of staves can be cut from the timber before transportation, and these are already dressed, and ready for use, either for liquids or solids.

These are only a few of the very many useful applications of this sort of travelling machines. Others will suggest themselves to our readers.

It must be very evident, that whatever brings into use property of little or no value, enabling the produce of such land to compete successfully with that of much better, must add to the wealth of the landholder, or timber merchant, a sum equal to the cost of the best land.

Thus a greater uniformity of value would result, and of consequence a more equal competency to those on or away from great water courses and canals.

Our object is to draw attention to this question, and we should be much gratified if any of our friends would furnish us with such information on the subject as they may have at their command.

This information from various quarters when collected, might furnish results equally useful and interesting—and we shall feel most happy in becoming the medium of their communication to the public.

From the Silk Culturist.

PRICE OF CHINESE MULBERRY.

The great advance in the price of the Chinese mulberry during the past year, furnishes us with satisfactory evidence of the estimation in which it is held, and of the eagerness with which the people of this country are embarking in the culture of silk. Last spring we purchased a few, which had

endured the severity of the preceding winter, at ten cents a piece, and thought we paid the full value of them. The same sized trees are now selling at thirty cents by the thousand, at the nurseries. We are also credibly informed that the demand in France is so great that they have risen near fifty per cent. The value of this tree is not as yet duly appreciated, but should it become thoroughly acclimated, of which there is now but little doubt, it will soon become the pride of America as it has long been of Asia. The high price of the tree ought not to discourage farmers from procuring a few for the purpose of propagation. It will be many years before the whole country can be supplied from the seed, and whoever propagates it by cuttings, layers, or inoculation, will be abundantly recompensed for his expenditure and labor.

From the Rail Road Journal.

MARBLE CEMENT.

An important improvement, which has been for several years in progress, is about being introduced to the more general notice of the public, and we believe into extensive use for building purposes. It is a composition, or cement, of which the principal ingredient is marble or limestone, which, when applied to the inner or outer walls of buildings, presents the appearance of polished marble, of the various hues and qualities which distinguish the beautiful material imitated. What would be thought of a magician who possessed power of changing the sombre brick and stone walls of the buildings of a city, in one week, into substances resembling the most beautiful Grecian, Italian, Egyptian or Verd Antique Marble, or porphyry, like the rock of Gibraltar? Yet all this may be done by this invention of an humble citizen of Orange county, in this state. This cement has been sufficiently tested by experiments on buildings, to satisfy practical men of its decided superiority over any other cement, stucco, or other hard finish for walls, hitherto known. In our next number we expect to be able to furnish the public with some interesting particulars, on this subject; and in the mean time we can state, that a company has been formed, in this city, to carry on the operations connected with the manufacture of this new cement, and its application to buildings. Those who are curious in these matters, may obtain further information in relation to it, by applying at this office, or at the office of Edwin Williams, over Leavitt, Lord & Co., Broadway.

From the New York Farmer.

NEW MODE OF OVERCOMING STEEP INCLINED PLANES ON RAILWAYS.

I witnessed at the capitol with great pleasure on Monday last, Mr. Smith Cram's (of the city of New York) invention for overcoming an elevation in rail road transportation of 440 feet to the mile. It was performed with expedition by a single stroke perpendicular engine, which, in point of power, suffers much in comparison with a double stroke locomotive engine.

His plan as exhibited, puts at rest all doubt as to the practicability of ascending and descending hills from 450 to 600 feet to the mile, with certainty and security. As to the certainty of overcoming elevation and inclination, the cog-wheels and ratchets as arranged satisfactorily show. As to the security, it is to be found in the introduction of his hydrostatic cylinder attached to the car which is designed to check the train of cars in ascending, should any accident befal the engine, and to regulate their velocity in descending, or check them altogether. The accuracy of the principle in both cases is perfectly clear, and promises to be of incalculable value in the present age of improvement; and I doubt not it will be generally adopted upon the score of economy as to time and money; but above all, the preservation of human life, which his plan so effectually guarantees, in comparison with the present mode of overcoming a trifling elevation by stationary power, committing our lives to the hazard of a single rope.

FULTON.

From the Southern Literary Messenger.

ADVANTAGES OF MANUAL LABOR SCHOOLS.

Extract from an Address delivered by the Rev. B. F. STANTON before the "Literary Institute" of Hampden Sydney College.

* * * * * The following important positions, however, in regard to the subject, may now be considered as established. Constant habits of exercise are indispensable to a healthful state of the body. A healthful state of body is essential to a vigorous and active state of mind. The habit of exercise should commence with the ability to take it, and should be continued with that ability through life. Of the different kinds of exercise, as a general rule, agricultural, being the most natural, and to which the human constitution is best adapted, is the most unobjectionable; *mechanical* is the next; and walking and riding are the employments which follow in the rear. The exercise most profitable, for the most part, will be that which is most useful. The neglect of exercise, with sedentary men, has occasioned fearful havoc of health and life; and the wilful neglect of it, with those who have had an opportunity to be enlightened with respect to its necessity and value, is a species of suicide, and, therefore, *an immorality*. The connection of *manual labor establishments with literary institutions*, has been found to be greatly conducive to health and morals, as also to proficiency in the various departments of human learning; and as far as experience has gone, the promise which they give of success is all that their most sanguine projectors had anticipated.

On the subject of *manual labor schools*, a deep interest has within a few years been excited in various parts of the Union. Like all other enterprises which aim at the accomplishment of extensive good, it has met with opposition and discouragements; but originating in the principles of true wisdom, and supported by arguments and facts which none can gainsay or resist, its ultimate triumph may safely be predicted, and confidently anticipated.

Whether the system of physical education shall receive the countenance, or is suited to the peculiar circumstances of the southern country,

may with some be made a question; but we are ready to hazard the assertion, that whatever obstacles of a peculiar nature may here lie in the way of reducing it to practice, if properly considered, they must be seen to be in truth the most powerful inducements that can be urged for its adoption.

The country in which physical education cannot prevail, in the onward march of improvements for which the present age is distinguished, must necessarily be destined to be outstripped in the pursuit of those objects which constitute the felicity and the glory of a people. That this country is to fall behind, and to be contented to remain there, is to suppose an event too disreputable for tolerance, and too much opposed to a laudable spirit of emulation to be cheerfully acquiesced in. The south needs men of vigorous constitutions for professional avocations and other purposes, as well as the rest of the world, and if she has them, must obtain them by the same process. Trained on a different plan, her sons, in comparison with others, will be effeminate and inefficient. Many of them, as has happened with others in past times, would become the prey of incurable disease, or fall the victims of an untimely grave. According to the most accurate investigations that have been made, at least *one-fourth* of the individuals who, for several years past, have been educated in our American colleges, have been completely prostrated in their course, or have survived only to drag out an existence rendered burdensome to themselves and unprofitable to others. The voice of warning on this topic, while mournful and alarming, is as "*the voice of many waters.*"

* * * * *

In opposition to the system of education which we would defend, a voice of objection has been raised, to which it may not be improper to pay a passing regard.

It has been preferred as an objection to manual labor schools, which we shall assume, are, on the whole, the most unexceptionable expedient that has been proposed for connecting exercise with a course of literary training,* that *youth who have been unaccustomed to manual labor, and who have been permitted to indulge in idleness and sportive amusements for the purpose of recreation, will feel an insuperable aversion to the toils and restraints which such a revolution in their habits, as the one contemplated, will impose on them.*

The process of *taming*, though quite essential to the unruly, to "flesh and blood" is never "joyous, but rather grievous." The objection started is something like that which the celebrated Rush, in some of his original effusions, has observed is met with in the case of certain morbid patients, whose *weak stomachs refuse milk as a diet.* The food itself, in the judgment of the acute physician, is of the most simple, inoffensive, and invigorating character; and *the fact that it is rejected is the proof that it is needed.* The intemperate can ill brook the privation of *alcohol;* the epicure and debauchee will not relinquish with good will the gratification of inordinate appetites; nor will the *slothful,* who *turns himself in his bed as the door on the hinges,* give up with cheerfulness *the luxury of laziness.* But the true and proper question for determination is, would it not be doing to loungers and profligates themselves, as well as to others, a kindness, to put them upon a course of *regimen,* (provided it can be done without too great an exertion of violence,) which should bring them back to nature, and constrain them to a just and proper observance of the salutary laws of industry, sobriety, and temperance? With such an authority we think that the parents and guardians of youth every where should be invested; and those who should manifest a spirit of insubordination against its exercise, if that spirit could not be quelled by a temperate yet firm resistance, would exhibit the proof of a temper that ought to be regarded in a young man *as a positive disqualification for receiving an education.*

In our apprehension, it is by no means among the most trivial considerations that recommend the manual labor feature in a system of education, that it furnishes an admirable *test* by which to try the spirit of a pupil, as well as a choice expedient to invigorate his health, and inure him to habits of diligence and sobriety. A young man whose aversion to a manual labor school is so strong that it cannot be overcome, when the subject has been fairly presented to his mind, it may safely be taken for granted, is not worth educating. The community would lose nothing by the operation of a system which should exclude him from the ranks of its *literati.* Especially would the test in question operate favorably in the education of the *beneficiaries* of the church, whom she is at present somewhat extensively engaged in patronizing, and preparing for her future ministry. Great as we conceive it, and great as the history of past ages has proved it to be, is the hazard which the church runs of rearing an impure priesthood, by proposing the *gratuitous education* of all the professedly "indigent and pious" who will apply for her bounty. The tempation to insincerity which is thus held out is too powerful to be resisted by depraved human nature. The church for safety in this respect must raise munitions and throw up her ramparts, to guard against the admission of unhallowed intruders. And what better defence, we would ask, could the ingenuity of man have devised for the prevention of the evils adverted to, than that *the entire amount of contributions which are made for the education of candidates for the ministry, should flow to them exclusively through the manual labor channel?* An inspired Apostle has said, that *if any man will not work, neither shall he eat:* and in perfect accordance, as we think, with the spirit of this declaration, we would unhesitatingly affirm, that if any man, who has the ministry in view, when the opportunity is fully presented, will not enter a manual labor school, *and labor, working with his own hands,* for at least a part of his support, *neither should he eat the bread of the church,* nor be fostered by her charities to minister at her altars.

To say that students for their recreation need something more amusing and sportive than the useful and sober exercises of agricultural and mechanical employment, is to say that the propensity of young men to levity and frivolity is so powerful that it cannot be, and ought not to be, controlled; that to aim to instil into them the habits and sentiments of gravity and sobriety, is an unnatural and impracticable undertaking; and that it is more advisable to treat them as *merry Andrews,* than as

*Gymnastic exercises are both dangerous and frivolous,

possessing the dignity of rational, immortal and accountable creatures.

Let a system of education make provision for nothing but what is elevated and useful, and still space enough will be left for all the frivolity and sporting which any can deem to be absolutely essential. These things will take care of themselves, and will inevitably come in, on any plan that may be adopted, to secure all the advantages which they are capable of affording.

Another objection which has been preferred to manual labor schools is, *that they contribute but little or nothing to the support of the student.*

The truth on this subject, as could be satisfactorily shown is, that, as might naturally be expected, manual labor schools, being a novel experiment in this country, have had to struggle, as do all similar enterprises of benevolence at the outset, with formidable obstacles; and in some instances, through injudiciousness in their location, or mismanagement in their arrangements, have either been abandoned, or have failed to fulfil the expectations of their projectors. Mercantile and other adventurers often fail in their plans. At the same time it is undeniable, that some institutions of this sort have succeeded beyond all previous calculations, and the students that composed them have not only enjoyed better health than others, and made more rapid advances in knowledge, but a portion of them have, by the avails of their labors, defrayed *the whole* of their expenses; a few have done *more;* and a majority have diminished them about *one-half.* Manual labor establishments, therefore, will do *something* (we ought not to expect them to do *every thing,*) towards *cheapening* education, even in the infancy of their existence; and the thought can hardly fail to be cheering to American republicans and patriots, that in the full tide of successful operation which we believe will attend their maturer age, "full many a flower" which but for them would be "born to bloom and blush unseen," will shed its "sweetness on" Columbia's "air."

But admit for a moment that manual labor schools are an utter failure as regards *the pecuniary advantages which they afford.* Admit, if you please, that the manual labor feature is an expensive part of education, and that to comply with it, an education will cost more than on any other plan. The argument for their utility remains alike unanswered and unshaken. Is not the education thus obtained a more perfect one? Is it not immensely more valuable? Are health, morals, useful habits, vigorous intellects, and life, worth nothing? Is money expended for the improvement and preservation of these thrown away?

If manual labor schools increased the expenses of education *fourfold,* they would still deserve the warm patronage of the public, and all who have the ability should send their sons to them to be educated, in preference to any other institutions, even should they have as many of them as the patriarch, or be endowed with the riches of Crœsus.

It is an ill-judged economy which saves money at the sacrifice of life, health, and morals. Let this subject be *understood* by an intelligent and Christian community, and manual labor schools will not be left to languish and die without endowments, while on other institutions of less substantial claims, they are lavished with a princely munificence.

In this place, it may not be amiss to attend for a short time, to the testimony of some of the pupils and superintendents of manual labor schools, who have detailed the results of their observation and experience, and which is strong and decided in their favor.

In one instance the pupils say, that "believing the results of experiment weightier than theory, we beg leave respectfully to express those convictions respecting the plan of our institution, which have been created solely by our own experience in its details. 1. We are convinced that the general plan is practicable. 2. That the amount of labor required (three hours per day) does not exceed the actual demands of the human system. 3. That this amount of labor does not retard the progress of the student, but by preserving and augmenting his physical energies, does eventually facilitate it. 4. That the legitimate effect of such a system upon body and mind, is calculated to make men hardy, enterprising and independent; and to wake up within them a spirit perseveringly to do, and endure, and dare. 5. Though the experiment at every step of its progress has been seriously embarrassed with difficulties, neither few in number nor inconsiderable in magnitude, as those know full well who have experienced them, yet it has held on its way till the entire practicability of the plan stands embodied in actual demonstration. In conclusion, (they add,) we deem it a privilege, while tendering this testimony of our experience, to enter upon the record our unwavering conviction, that the principle which has been settled by this experiment involves in its practical developments an immense amount of good to our world; it is demanded by the exigences of this age of action, when ardor is breathing for higher attempt, and energy wakes to mightier accomplishment."

On a subsequent occasion another set of pupils belonging to the same institution, express their convictions in a similar tone of approbation.

"The influence of the system," they say, "on health, is decidedly beneficial, as all of us can testify who have pursued it for any length of time. We can pursue our studies not only without injury, but with essential advantage. Not only is our bodily power increased instead of being diminished on this plan, but the powers of the mind are augmented, while moral sensibility is not blunted by hours of idleness and dissipation. We suffer no loss of time, as no more is spent in labor than is usually spent by students in recreation; and we are taught to improve every hour. Our opinion is, that intellectual progress is accelerated rather than retarded by this system. In its success, we are convinced, is deeply involved the prosperity of education, and the great work of evangelizing the world."

The students of Cumberland Colledge in the State of Kentucky, say, we beg leave to state the results of our own experience. Having been for a considerable time, members of a manual labor institution, we have had an exhibition of its principles and efficacy continually before us; and we are convinced that labor, for two hours or more each day, is essential to the health of all close students, and equally necessary for the development of the mind."

The young men in the theological institution at Hamilton, in the State of New York, say,

"we feel the fullest conviction that every student who neglects systematic exercise, is effecting the ruin of his physical and moral powers. Nor is the influence of this unpardonable neglect less perceptible or deleterious, as it regards his moral feelings. Without it, however pure his motives, or ardent his desire to do good, we have but faint hopes of his success. Such habits as he would inevitably form, we believe, would ruin all the nobler energies of his nature. We think three hours appropriate exercise each day will not eventually retard progress in study. We must say, from five or six years experience in the institution, we have not learned that any close student has ever completed an entire course of study without serious detriment to health. We hope, however, our present system of exercise will soon enable us to exhibit a different statement. In the preservation and improvement of health, we have found an unspeakable benefit arising from systematic exercise. Without it, we deem it impossible for the close student to preserve his health."

The superintendents of a kindred institution, in a document which they have laid before the public, declare, that they "have great satisfaction in being able to state that a strong conviction pervades the minds of the *young men* generally, as well as their own, that laborious exercise for three hours per day does not occupy more time than is necessary for the highest corporeal and mental energy; that so far from retarding literary progress, it greatly accelerates it; that instead of finding labor to encroach upon their regular hours of study, they find themselves able, with a vigorous mind, to devote from eight to ten hours per day to intellectual pursuits; that under the influence of this system, mental lassitude is seldom if ever known; that good health and a good constitution are rarely if ever injured; that constitutions, rendered delicate, and prostrated by hard study without exercise, have been built up and established; that this system, with temperance, is a sovereign antidote against dyspepsia and hypochondria, with all their innumerable and indescribable woes, that it annihilates the dread of future toil, self-denial, and dependence; secures to them the practical knowledge and benefits of agricultural and mechanical employments; gives them familiar access to and important influence over that great class of business men, of which the world is principally composed; equalizes and extends the advantages of education; and lays deep and broad the foundations of republicanism; promotes the advancement of consistent piety, by connecting *diligence in business* with *fervency of spirit*, and will bless the church with such increasing numbers of ministers, of such spirit and physical energy, as will fit them to *endure hardness as good soldiers of Jesus Christ.*

We are every day more and more impressed with the importance and practicability of the manual labor system, as the only one by which the increasing hundreds and thousands of the pious and talented sons of the church can be raised up with the enterprise, and activity, and power of endurance, which are indispensable for the conversion of the world to God.

To these statements the individual who has collected them, adds his own testimony in the following language: "I have been for three years and a half a member of a manual labor school. The whole number of my fellow students during that period was about two hundred. I was personally acquainted with every individual, and merely "speak what I know," and "testify what I have seen," when I state that every *student* who acquired a reputation for sound scholarship during this time, was a *fast friend* of the manual labor system. The most intelligent, without a single exception, were not only thoroughly convinced of the importance of the system, but *they loved it with all their hearts.* They counted it a privilege and a delight to give their testimony in its favor, and they *did it* in good earnest. Their approval of the system rose into an intelligent and abiding passion; and it is no marvel that it was so; for they had within them a permanent, living consciousness of its benefits and blessings. They felt it in their *bodies*, knitting their muscles into firmness, compacting their limbs, consolidating their frame work, and thrilling with fresh life the very marrow of their bones. They felt it in in their *minds*, giving tenacity to memory, stability to judgment, acuteness to discrimination, multiform analogy to the suggestive faculty, and daylight to perception. They felt it in their *hearts*, renovating every susceptibility, and swelling the tide of emotion. It is true, with a few, a very few of the students, the system was unpopular, and so were languages and mathematics, philosophy and rhetoric, and every thing else in the daily routine, *save the bed and the dinner table.* Such students were snails in the field, drones in the workshop, dumb in debate, pigmies in the recitation room, and cyphers at the black board.

"In every manual labor school which I visited in my tour," he continues, "it was the invariable testimony of trustees and teachers, that the talent, the scholarship, the manliness, the high promise of all such institutions, were found among the pupils who gave the manual labor sytem their hearty approval; whereas if there were among the students brainless coxcombs, sighing sentimentalists, languishing effeminates, and other nameless things of equivocal gender; to prostitute *their* delicate persons to the vile outrage of manual labor, was indeed a *sore affliction!*"

We shall close these selections by adding to them the testimony of an individual* of distinguished literary attainments, whose advantages for obtaining correct information on this topic, as well as many others, have been of the most favorable kind.

"The God of nature," he observes, "has designed the body for action; and all efforts to counteract this design, end of course in disappointment, sooner or later. The same God has designed that men should *cultivate their minds;* and I never can believe that this is deleterious in itself; it is so only when we neglect what he has bidden us to observe, i. e. daily discipline and effort to preserve health.

"Students want vacations, journeys, remission from employment, &c. &c. and this at a great expense of time and money. Why? Because they will not be faithful, *every day*, to watch over their health, and to use all the requisite means for its preservation. Why should the farmer, the machanic, the merchant, the physician, the lawyer, support a never ceasing round of employment, and the student not? Is there any curse laid by heaven upon study? No; it is inaction—laziness—that

* Professor Stuart.

makes all the mischief, and occasions all the expense. This is my full persuasion from thirty years experience, and somewhat extensive observation."

To these selections others of similar interest and importance might be added from the *Report* from which they have been derived, particularly the numerous and harmonious opinions of literary men, *on the necessity and utility of regular systematic exercise to the student;* but our time forbids the indulgence, and the maxim of *Festina ad finem* admonishes us to cut short this address.

From the view that has been taken, we perceive then, with a clearness which cannot be mistaken, that the manual labor system of education is applauded by "a cloud of witnesses," and commended to our patronage and attention by arguments and facts innumerable, palpable, and unanswerable. Will the inquiry be misplaced, when we ask, Shall it *here*, (on this consecrated ground, this literary *high place*, which is destined to send forth a mighty stream of influence for good or ill, to an extent which no arithmetic can calculate,) shall it *here* receive the countenance and patronage which it so richly deserves? Manual labor schools are already in successful operation in this southern country, and the prosperity that has attended them has been such as to silence the cavils of opposers, and remove the apprehensions of the distrustful. With all enlightened and candid persons there can be but *one mind* respecting their practicability and their *peculiar* importance in this southern region. It is the very section perhaps, of all others, within the limits of our republic, that is best adapted to their growth, both on account of its soil and climate, and in which, from its peculiar situation, their influence is most imperiously demanded.

Again, then, I ask, will "the ancient and honorable Dominion" consent to be outstripped by her neighbors in an enterprsie of so much grandeur and promise? Will parents, instructors, and pupils, repose in inglorious ease, and cry *a little more sleep, a little more folding of the hands to sleep*, while others in the race of competition press forward and bear off the prize? Will the young men of Hampden Sidney and Union Seminary sit still; or will they "awake, arise, and put on their strength?" Interests that are dear as honor and life; are suspended on the *practical* reply which this inquiry receives.

It is stated, as is probable on good authority, that in years that have gone by, "some of the Virginian philanthropists offered to educate some of the Indians, and that they received from the shrewd savages the following reply." (He that hath ears to hear, let him hear what the *savages* have said to the *civilized!*)

"Brothers of the white skin! You must know that all people do not have the same ideas upon the same subjects; and you must not take it ill that our manner of thinking in regard to the kind of education which you offer us does not agree with yours. We have had in this particular some experience. Several of our young men were some time since educated at the northern Colleges, and learned there all the sciences. But when they returned to us, we found they were spoiled. They were *miserable runners.* They did not know how to live in the woods. They could not bear hunger and cold. They could not build a cabin, nor kill a deer, nor conquer an enemy. They had even forgotten our language; so that not being able to serve us as warriors, or hunters, or counsellors, they were absolutely good for nothing."

The calamities which are here set forth in such graphic terms have by no means been confined to the fathers and the sons of the forest. The *white* young men of Virginia, in great numbers, have since been educated in like manner "at Northern Colleges," or nearer home: and when restored to their parents and guardians have been found, for the most part, like the sons of the *red men*, to be "*absolutely good for nothing.*" They have proved to be "miserable runners." Not one in twenty of them has risen to eminence in professional life. They could "bear neither hunger nor cold." They were practically ignorant of mechanical and agricultural employments, and strongly averse to them; too high minded and indolent to labor, and too weak and effeminate to "serve as warriors, and hunters and counsellors." Will Virginian parents learn a lesson from their own past experience and that of their savage predecessors? The corrective which we propose for the evil complained of, (and it is too serious for merriment,) is the immediate introduction of the manual labor system into all our institutions of learning. If this feature is introduced and kept up in them, with a prominence proportioned to its importance, our youth, who are educated in them, if not fitted for usefulness and distinction in the departments of law, medicine and theology, will not be utterly "spoiled" as the sons of the *red men* were; but will be good "runners," useful and respectable laborers, mechanics, planters, and farmers. This after all, is the population, of which, more than any other, Virginia needs an increase. The low state of mechanic arts and of agriculture among us, or rather the prevailing vice of *indolence*, is the true source of the present disasters which are so often made the theme of popular declamation by stump orators and upstart politicians. It is *indolence*, more than any or every thing else, that checks the spirit of enterprise; that covers this fairest portion of our continent with *sackcloth*; and spreads over it the sable shroud of desolation. Let then a revolution be effected in our system of education. Let our youth be trained for the duties of practical life. Let them be instructed in what is useful, as well as ornamental; and let them bring minds stored with the riches of learning and science, to bear and act on *the subject of most absorbing temporal interest to the American people*, I mean the neglected subject of *agriculture*, and all will yet be well. The citizens of the south will then be independent indeed, and not in boast. Labor, like "marriage," will be "honorable in all." The work which misguided abolitionists are laboring with a zeal that would be becoming in a better cause, to perform by a meddlesome and violent interference, will be effected by the gradual and voluntary agency of her own inhabitants. Her population will multiply. Commerce will thrive. Barren fields will be clothed with verdure. The productions of the earth will be increased. Crowded cities and smiling villages will spring up. The halls of legislation will be occupied by the hardy and virtuous cultivators of the soil, the men of all others the most safe to be entrusted with the enactment and administration of laws. Colleges, academies, and schools, will prove the nurseries of enlightened, healthful, industrious, and happy freeman; and Christianity,

untrammelled by the obstacles that now so powerfully impede its progress, with a field wide and waving with a luxuriant harvest open and inviting before her, will send abroad her genial and regenerating influences, and render this the Paradise of lands.

DIFFERENT EFFECTS, COMPARED, OF THE GREEN SAND, CALCAREOUS MARL, AND THE MIXTURE OF BOTH.

[We are much gratified in being able to present the following practical statements upon a subject which is not only mysterious in itself, and has as yet been inexplicable, but which has been rendered still more obscure by all the mass of writings on the subject. Imperfect and defective as are the following statements, if considered as *data* on which to found a theory of the action of green sand, they are the first which we have seen, of undoubted authority, which throw much light on the subject. Our correspondent generally and correctly discriminates between what are indeed three manures of very different kinds, viz.: Green sand alone —calcareous marl alone—and any mixture of the two. These have been so generally confounded under the one general name of *marl*, that facts have been misconstrued, and therefore false deductions necessarily made, even when there was no other cause for error. Our general views on the difficulties of this subject, were stated at page 86, vol. 4, and therefore will not be here repeated. We will only request of our correspondent that he will refer to those observations, and state whatever his experience may offer in confirmation, or in contradiction, when he writes his promised continuation. Almost every thing is yet to be learned respecting "green sand."

It is inferred, from our correspondent's remarks, that in all the extensive marlings on the borders of the Pamunky, the green sand has been largely intermixed with the calcareous matter. On the contrary, all the marlings referred to in the Essay on Calcareous Manures, or that had been then executed or known by the writer, were of calcareous marl alone, with the exception of the small portion mentioned (p. 48 2nd ed.) as being dressed with what was called the "gypseous marl" lying under Coggin's Point—which marl was there treated as a substance of rare, peculiar, and valuable qualities, and which in fact is rich *eocine* marl, containing green sand as well as gypsum.]

To the Editor of the Farmers' Register.

Chericoke, King William Co. June 9th, 1836.

Dear Sir: In your favor of the 24th ultimo, you request that I will give you my views respecting green sand marl, for publication. As upon the score of giving and receiving agricultural information, and particularly upon the subject of marls, I am much your debtor, I feel disposed to comply with your wishes: if, indeed, any thing I can have to say, may be thought worthy of the public notice. And, indeed, I should not have waited your request, had I thought that the results of my experience in the use of marls, would have at all been interesting to any one, or have made one convert to its use—as there is no one more alive to the interest and welfare of his country than I am, or more anxious for its agricultural improvement—nor can any one be more satisfied of the utility, nay, the necessity there is, of the use of calcareous manures with our soils, to enable us to arrive at a profitable, much less a high grade of agricultural improvement.

Your views (as contained in your Essay on Calcareous Manures,) respecting our soil, and the nature of putrescent manures, entirely accord with my experience: and practical results, I look upon as the only sure test of all theories. There is certainly no abiding principle of fertility in putrescent manures alone, nor do I believe land can be carried to more than a certain degree of fertility by their use; but by the addition of calcareous matter, I think it would be difficult to affix limits to the degree of productiveness that may be arrived at. You will doubtless say I am an enthusiast: well, perhaps I may be somewhat sanguine in my temperament, but zeal I think is a good fault in a farmer, particularly where it is tempered with reason and experience—and I shall say nothing in which I am not warranted by my own observations of cause and effect. And certain it is, that unless agriculture can be carried to a much higher grade of profit, than it has hitherto attained among us, the Old Dominion must be abandoned, sooner or later, by at least the present occupants. But I find I am fast getting off from the subject of your inquiries, and must therefore rein in my pen, and come back to the starting place, which was, I think, my experience, or rather views, respecting the green sand marl.

My experience with the green sand is limited, perhaps too much so to say any thing about it; but the green sand marl I have been using for 4 or 5 years; indeed, all the marl on this river (Pamunky) is of that character; different locations differing greatly, as to the quantities of the different ingredients. Some of the locations contain a large per centage of gypsum; some are of gypsum and green sand. Some contain the two former, with lime in a goodly ratio. Some, perhaps much the largest deposites, contain no gypsum, but about equal quantities of green sand and lime, say 34 or 35 parts of each. What Professor Rogers calls the pure green sand, contains but little lime, and no gypsum; but you find interspersed among it all, as far down as I have gone into the lower, or third stratum (reckoning downwards) of the tertiary formation, more or less of shells, and differing from the stratum above it in the shells being generally whole, but easily broken with the fingers. Some very large and perfect specimens of the *cardita planicosta*, and many very minute shells of a different species, but also perfect—whereas the stratum above it is exceedingly rich in lime, containing perhaps 60 or 70 per cent. of shells, almost all decomposed, or in a state of lime, with much green sand. In the most abundant deposites, above referred to, containing about equal parts of green sand and lime, the particles of green sand are about as large as fine gunpowder, which when taken on the point of a knife and marked on the nail, produce a fine verdigris color; whereas in the higher qualities of green sand, the particles are too fine to detach. The former, I suppose, is what is called the "gun-powder marl."

I met lately with Professor H. D. Rogers of the Pennsylvania University, at one of the banks on

this river, and he told me that this was identically the same with the New Jersey green sand, that it appeared there in all the varieties it did here, with and without lime, but that some of the Jersey green sand was richer than any he had met with here. But the green sand of Jersey differs from ours in a geological point of view, being of the secondary formation, and therefore the shells differ from those of the deposite here, as to kind, but agree as to quality.

As I before observed, my experience with the green sand proper is limited. I had never heard of the name, much less know the value of the article, until last winter 12 months, when I met with Professor Rogers' paper on the subject in the Farmers' Register, previous to which, I had always rejected the green sand, when we came to it in working our banks: having tested it by analysis, as regards lime, and finding very little, I rejected it as altogether worthless. Since knowing its character, I have used a good deal of it; but do not think we have had time enough, yet, properly to test its merits: however, as far as we can judge, so far, its effects are flattering; indeed in some instances very remarkable. The finest celery I ever saw grow, was in trenches half filled with green sand, and no manure; it was doubly as good as the rest of the square, (which was also good,) cultivated in the usual way, the trenches well manured, but without green sand or marl. I also tried it on a galled knoll, where the soil was entirely washed off. The land was lightly sprinkled with straw, a part was dressed with marl, containing a goodly portion of lime, and some green sand—good marl, but not the best quality. The other part was dressed with green sand, both at the rate of 200, or 250 bushels to the acre. Where the first was applied, the land gave some signs of vitality, (the whole piece being planted in corn.) Where the green sand was applied, there was a smart growth of corn, with pretty good ears, the other producing none. But the most decided proof of its beneficial effects, was evidenced on cotton. I selected, as I thought, the poorest spot on the farm where I reside, the spring of 1835, (being a part of one of those cattle-starving, comfort-killing appendages, called a standing pasture,) and fallowed up a few acres which I put in cotton; the whole was manured in the drill with coarse litter. On about 3 acres, the litter in the drills was top-dressed with green sand at about 100 bushels to the acre; but I should observe, that this green sand was of an inferior quality to that used with the celery and corn, not being from the same deposite, and being the upper, or overlying stratum of the tertiary formation, containing about 30 per cent. of green sand and 5 of gypsum, most of it having no lime at all. On another acre, old ashes in about the same proportion were applied, in the same way, and the cultivation was precisely the same on these 4 acres, as on the rest of the patch. Where the green sand and ashes were put, I could see no difference: but between that, and where no marl or ashes were put, it was as five to one or more. Where the green sand and ashes were applied, the cotton was of fine size, and as well branched and bolled, as I ever saw cotton, while that of the other was small and trifling—scarcely worth any thing. The green sand first spoken of, as being used with the corn and celery, I also used with cotton, upon land that had never before brought cotton, although frequently tried, being very light and sandy. It was used in the same way as the other, in the drill, with coarse litter: the crop was very fine for the year, maturing very early, and the staple good; it was decidedly the best cotton I saw last fall, and it was all open before the first frost. This piece of land, though, had been previously marled, and therefore I cannot say how much the green sand is entitled to claim for the crop. I tried the green sand also on cimlins the last year, but could see no effect; those on which none was put, being as good as where it was. They were all good, but I could ascribe nothing to the green sand.

My next experiment at home, was with turnips, both ruta baga and common white, (for here I have only been using marl since last summer.) The land was prepared as for the cotton, except that the litter was not so good, the drills four feet apart, the manure spread in time and top-dressed with green sand marl, being about equal parts of green sand and lime, say 34 or 35 parts of each, at the rate of 100 bushels to the acre; the land was then bedded on the litter, and the turnips sowed on the top of the beds. This was ordinary land, not good for more than 3 to 4 barrels of corn to the acre; it was forgotten to leave out any rows without marling. The fall was said to be a bad one hereabouts for turnips, but the whole crop was excellent, perhaps the best I ever had. The only difficulty with them was, that the marl forwarded them rather too much for winter keep.

In September and October, I marled about 50 acres of clover fallow for wheat at the rate of 200 bushels per acre, the marl being that last spoken of, equal parts of lime and green sand. So far the wheat promises well: without additional disasters, or an increase of the strut, with which it is seriously affected, it will probably make 20 or 25 bushels per acre.

The effect, or supposed effect, of marl on this wheat, I should not have mentioned, as the land was in good heart, and had a good growth of clover on it, but for the fact of the field, (which is all light land,) having several sandy knolls in it, which had no clover on them, and which I scarcely ever saw bring wheat or corn; and I can now see but little difference between those spots and the rest of the field: *that* certainly proves something. The land was fallowed with three-horse, or rather 10 inch Davis ploughs, the marl then spread, and reploughed with smaller ploughs as shallow as possible, the wheat then sowed and dragged in both ways, so as to mix the marl as perfectly as it could be effected.

On the plantation where I commenced marling 4 or 5 years ago, all has been realized that the most sanguine could have anticipated. The open land will be nearly finished this year once going over, at about 250 bushels to the acre; and the farm now presents an entirely new face. Where three years ago there was a sparse growth of hen's grass, now is the most luxuriant clover. The first land I marled there, was a very poor piece of hen's grass indeed; the next year it came into corn, when it received a light dressing of coarse manure. The corn was good, say 6 or 7 barrels at least; it was followed by wheat, which was also excellent, and the clover is now, I dare say, as good as any I ever saw. I find the deep blue marl, or having that appearance in the bank, containing most green

sand, decidedly more beneficial than the lighter colored or gray marl, containing fully as much lime, but less green sand—as will the green sand marls generally on the river, producing a much more prompt and efficient action than the white, or miocene marls of the forest, although the latter contains a much larger amount of lime, than any of the eocine, or green sand marls. But it all repays the farmer, with compound interest, for its use.

As far as my experience goes, I find that with all marls, or rather calcareous matter, such as we call in this country marl, it is time thrown away, or worse, at least for the time being, to apply marl without vegetable matter of some sort. Stable and farm pen manure, and clover, of course are best to use with it; but I find any vegetable matter answers well in sufficient quantity. From my present experience with the use of marls, I certainly prefer the mixture of the green sand and lime, or what we call the green sand marl, to either green sand or lime alone. The green sand marls seem to exert a wonderful effect on clover, and all grasses with which I have tried it. It certainly forwards to maturity too, all crops with which I have used it; cotton, I think, 2 or 3 weeks at least. The fallow wheat to which I have referred above, is now at least ten days forwarder than any in the neighborhood of the same kind. I have found the only way to marl efficiently, was to have a detailed force, set apart from the crop, and kept constantly at it. We never stop our carts when the weather will permit hauling, except in harvest and seed time.

A good many are now beginning to turn their attention to marling in the forest, and some on the river; and in every case where it has been judiciously applied, the same good results have attended. And I see no good reason to doubt, why the fondest anticipations of the patriot and philanthropist should not be realized, as regards the tide-water section of Virginia—if the people will only shake off that lethargy and inaction which it seems so easily besets them, and use the means aright with which nature has so abundantly supplied them.

My views and experience upon the transportation of marl by tide-water, as well as the utility of a rail road, intersecting the heart of the eocine district, across from Richmond to the Rappahannock, &c. &c. I must defer for another communication, if you think them worth notice.

I have now, sir, given you a crude synopsis of my experience with the green sand marl, and somewhat, my views respecting its use. Should you be able to winnow any wheat from the bulk of chaff, which you may think would add to the general fund of agricultural information, or at all interest or benefit any of your readers, it is at your service to dispose of as you think proper—to give it to the public, or throw it aside as worthless.

C. BRAXTON.

From the Cultivator.

ON THE MANUFACTURE OF BEET SUGAR IN THE UNITED STATES

Paris, April 15, 1836.

MY DEAR SIR—A long space of time has elapsed since my last communication to the State Agricultural Society. Meanwhile I have not had a moment out of mind the promise I made in it to resume the pen as soon as I should have something worthy of being recommended to their attention. It is long since I have been convinced of the vital importance for France of raising the beet root and manufacturing it into sugar. Some time after my last arrival in the United States, some of my friends wanted me to encourage it in America; one of them, chiefly, who had seen my successful establishment at my estate in France, and who knew I had received from the French government the gold medal offered for the best making of the beet sugar; but I could not recommend it for the United States, when I had witnessed how few had succeeded in this country, even during the reign of Napoleon, when sugar was four times the price it is now. Indeed, after that time the working of the beet sugar was entirely given up in Europe, except in France, where even I was almost the only one who would not give up so easily the hope of the great advantages that discovery was to offer one day or another; to a great part of the world. The benevolent monarch who succeeded the great emperor, was soon persuaded that there would be a great benefit for France in encouraging this new branch of agricultural industry. However, nothing more was found necessary to accomplish the object than a simple honorable reward for the most successful; for if the making of beet sugar was really useful, it would soon be proved by the benefits the manufacturers would make. The price of sugar had fallen more than one-half and many persons who had invested great capitals in the undertaking, met with very serious losses. However, several continued, and new improvements were keeping pace with, and even overbalanced the disadvantages of the constant lowering in the price of sugar. But, sir, I could not give any encouragement in the United States to similar undertakings before the improvements in the manufacturing of beet sugar were made. I am persuaded that it would have been the cause of complete failure in the attempts made by any one till very lately, though it has given great profit to some great establishments in France for a few years past. This I will demonstrate when I enter into more detail.

For the present moment, what I have said above will be sufficient to answer the double purpose of justifying my reserve upon this, so interesting subject, and deserving at the same time the confidence I wish to attain now, when I recommend the cultivation in the United States of the sugar beet, without any further hesitation, for the purpose of manufacturing it into sugar. I am convinced that it will be a very advantageous agricultural pursuit in all parts of the United States, and chiefly, in the middle and northern states. The great difference in the price of labor between France and America, which in the account of profit and loss, has produced a balance against the United States in the contemplation of this operation, is now overbalanced by the new discoveries and improvements in the fabrication of the beet sugar. To them, add in favor of the United States, the cheapness of the soil for the cultivation of the beet, and of the fuel for manufacturing the sugar. Those advantages are to be found in all the new states, and some considerable parts of Pennsylvania and New-York. There, also, they will have on their side, in uncommon abundance,

the fine water powers, which more than any thing else remedy the difference in the price of handwork between Europe and America.

But, sir, while I was admiring here, in the splendid establishments of this new industry, their fine machinery and their improved chemical processes, I was lamenting that the small proprietor or the farmer could not employ directly his produce by manufacturing himself. I am but just now perfectly satisfied that he can do it, and that with very inconsiderable expense, and without hiring any help; but simply with that of his family. I will quote the particular instance of a farmer in the north of France, (near Valenciennes,) who has received a medal from the Royal and Central Agricultural Society, for havig established on his farm one of the first small beet sugar manufactories, where he makes daily, without any assistance, but that of his family, 100 pounds of sugar fit for family use without further preparation. The whole house room consecrated to that purpose, is a room 16 feet square, and a cabinet 10 feet by 12. Now, sir, you can undoubtedly appreciate at once all the advantages that a farmer can reap in cultivating and manufacturing the sugar beet. It will be greater yet for those who have, as in the north of Pennsylvania and New-York, the maple sugar. The making of beet sugar may begin in October, and end commonly in March; it is just at the moment when the maple sugar is more commonly made; so that the same implements will answer for both manufactures, and the farmer will have employ for his family during the months when they have most leisure.

The Royal and Central Agricultural Society have just offered several handsome premiums, for whoever will communicate within this year the best methods for manufacturing the beet sugar on small farms. This has given me the idea of not waiting for my arrival in America, for recommending immediately the cultivation of the beet so that experiments may be made this fall and winter, by employing some of the best systems discovered here, and such as the inventive genius of Americans will not fail to discover.

I remain, my dear sir, with sincere regard,

Yours,

LE RAY DE CHAUMONT.

HON. JESSE BUEL.

P. S. I should have liked to add some notes upon silk and mulberries; but Mr. Tallmadge, with whom I am going to-morrow to see one of the largest establishments in France, will publish something upon the subject. If beet seed enough cannot be procured, a pretty large quantity will be found at Messrs. De Launay, Burgy & Co. in N. York.

ADULTERATION OF MILK IN THE CITY OF NEW YORK.

Extract from the New York Farmer.

Of the various animals, whose milk is employed for human food the cow, both in respect to quality and quantity, is most generally preferred. Goats', asses', and mares' milk are used; but for convenience, nutritiousness, and quantity, the cow is above all others to be chosen; and as far as food is concerned, may be considered among the greatest blessings which Divine Providence has bestowed upon mankind. As matter of diet, there is nothing which in proportion to its weight contains so much nutriment; and as a beverage, to a simple and unadulterated taste none can be more grateful. In the country, where it can be had pure and in abundance, it ought to constitute the great article of food for children and young persons; and the miserable and pernicious and perfectly innutritious substitutes of tea and coffee ought to be kept entirely out of their reach. In cities, however, pure milk is almost as difficult to be procured as pure water. In New York city, for example, the milk is first deteriorated, if we may be allowed so to state, in the cow's udder;—that is, where cows are fed upon distillers' swill, with scarcely any meal, and with barely hay enough to form a cud, the milk produced is of a very inferior quality; besides, with a large proportion of the milk-dealers, though not with all, it undergoes the ruleable and established dilution of one quart of water to four of milk; in addition to this, if it goes into the hands of the grocers, as in general they are too *modest* and *humane* to sell any thing like *strong* drink, it commonly undergoes another application from the town-pump. Indeed, we state upon the best information, that there are grocers in the city, who, without any aid from the cow, or at least the slightest possible, have offered the milk-men, when the supplies of the milk-men for their customers fall short, to furnish them from their own (the grocers') resources, what they may need to make their supply sufficient: that is, they literally manufacture the milk, as we sometimes say, "out of the whole cloth." The process, we understand, is this: to take some Indian meal of the white gourd-seed variety, and pass some scalding water through it; and this water dashed with a slight touch of milk, as Bloomfield calls it, "three times skimmed sky-blue," *can be afforded* at about five cents per quart; and at this rate is actually vended to the poor forlorn wretches, who want their cent or their two cents' worth for their tea and coffee. Now whether this be or be not a real Yankee trick we shall not venture to surmise, but the ingenuity of its performance belongs to the veritable city of Manhattan. It is however all of a piece with many of the London tricks, which London cream is readily manufactured out of flour or magnesia, and milk to a consistence to suit the most fastidious. The adulterations of human food, however, where it is susceptible of being adulterated to a profit, are most obvious and enormous, and it would be quite fortunate if all of them were as innocent as the above.

From the New York Farmer.

HAY AND HAY MAKING.

The season of hay cutting is just at hand. An operation so simple as that of cutting and curing hay every farmer feels that he understands, and would disdain on this subject any attempt to advise or instruct him. Be it so; the wise are glad to examine any subject, on which it is possible discussion or inquiry may throw some light; correct prejudices, or suggest new and better means of management; the wise in respect to any and every subject are never too wise to learn; and though our own observations or suggestions on any subject may have no just foundation, nor rea-

sonableness, and no pertinency, they may be useful if they excite the inquiries and elicit the observations of wiser or more experienced minds.

Hay making must be set down as one of the most important operations in husbandry. Hay with us is the great means of supporting our live stock. Our straw is principally used for litter or the subsistence of our young cattle. Grain and meal are always given with reluctance, excepting to fatting cattle; and comparatively no succulent vegetables are grown for the winter keeping of our stock. It is hoped in this latter case there may be a speedy alteration in the habits of our farmers; and that it will become as much matter of custom among our farmers to raise large crops of vegetables, with which to store their cellars as large crops of hay with which to fill their barns. Common white turnips, though very little in favor with us are a valuable crop both for sheep and neat cattle. The yellow varieties are still better, as they are more solid and retain their good qualities much longer. The ruta baga is a most excellent vegetable for sheep, cattle and horses. Potatoes, carrots, mangel wurtzel are all excellent. An agricultural friend, well qualified to judge, informs me that he prefers to all others the common blood beet. He asserts that according to his own experience, it is as sure a crop as any other; that it yields as much to the acre as any other; none will make more milk, or put on more flesh; none if properly taken care of will last longer; and none of equal value is raised with more ease or at less expense. My own experience in their cultivation and use disposes me to give almost entire credit to all these statements.

It would seem to be most important to the health of our animals, especially considering the length of our winters and the time during which they are confined to the stall, that they should have green and succulent food to mix with their dry; and that dry especially not of the best quality. Certainly very much of our hay is spoiled in the getting—it is cut not at the right time. It is made either too much or two little; so much as to become too husky and dry, or so little as to be heated and mouldy; in either case much of its nutritive power is lost; and though it may sustain life, cattle by the use of it lose their condition and become diseased; poor, hide-bound, costive and consumptive.

The time when hay should be cut is a matter not well settled and in which farmers in different places differ with each other. Different grasses ripen at different periods; and with some the season of flowering continues much longer than with others. It is ascertained likewise by chemical analysis that grasses at different periods of their growth yield more nutriment than all others. What in some parts of the country is called the English Bent, a fine and delicate grass, must be cut very early, or it becomes hard and wiry. Herds grass or Timothy grass, according to the experiments of Sinclair, must be allowed to reach an extreme ripeness in order to yield the greatest amount of nutritive matter. We have some incredulity in regard to the statements respecting this latter grass, and some hesitation whether these experiments, though highly exact and instructive, are to be considered conclusive as to the actual value of these grasses for feeding; and should deem some exact experiments with the cattle themselves made under favorable circumstances and by skilful and careful observers, much more decisive.

The time of cutting for most grasses is when they are in flower. If cut before this, they waste greatly and have little substance; and if suffered to stand long after this, they lose their succulence. It is advisable in this matter to be early, rather than late; and to cut before the plant is exhausted by flowering, or by forming seeds. It is then in the highest perfection. The time for cutting clover is longer than of other grasses, as it continues longer sending out a succession of flowers; but I am decidedly of an opinion that the sooner this grass is cut after it comes into flower, the better, as it is so apt to lodge and to become mouldy at bottom.

On the subject of the time of cutting grass I am happy to quote the opinions of a very able writer. "This rule of cutting grass, when it first comes into flower applies to every species of herbage, which is to be dried for winter food; but to coarse hay, the produce of wet or marshy grounds, it is strongly applicable; for most of the plants, which grow in these situations, when they are in full vigor, are as tender, and contain perhaps as great a proportion of nourishing juices as any other description of hay; and when cut at that stage and properly managed afterwards, form a valuable article of food both for sheep and cattle; but when the cutting is delayed, as indeed it very often is, till an advanced period of the season, when the plants have not only reached their ultimate growth, but begin to decay, this description of herbage becomes at once the coarsest and least nourishing of all food. This opinion does not proceed upon theory; but upon the solid grounds of experiments carefully made upon different kinds of herbage, at different periods of their growth, the result of which establishes a fact which cannot be two generally known, viz: that plants of all sorts, if they are cut when in full vigor, and afterwards carefully dried, without any waste of their natural juices either by bleaching with rain or exhalation, contain weight for weight, a quantity of nourishing matter nearly double what they do, when allowed to attain their full growth, and make some progress towards decay." These opinions are stated with great confidence; and are entitled to much consideration; and so far as they apply to our wet meadows deserve particular attention, since the cutting and curing of these grasses receive very little care; they are left standing generally until very late in the season; and the hay from them commonly is almost worthless, excepting for litter.

"In the survey of Perthshire, Eng. it is stated that as the great object of making hay is that of preserving as much of the natural sap as possible, the proper time for cutting it is when the crop of grass has attained its highest degree of perfection; when the plants are in full blow, and before their flowers begin to fade. If cut too green the hay shrivels and loses much of its bulk; if allowed to stand till the seeds are ripe, the stem becomes hard and wiry; the roots lose much of their natural sap; the aftermath is less abundant; and the principal part of the hay is in danger of crumbling away into short stumps, under the various operations which it must undergo. Better to be too soon than too late, especially if the crop be heavy and in danger of lodging."

"With clover the best time for cutting it is when the flowers are all fully blown and the earliest begin to turn brown. If allowed to stand longer, the roots of the stalks lose their leaves, and become

hard and sticky; and the plant is so much exhausted that it takes a long time before it sends up new shoots."

With respect to curing hay, it is important to put it into the barn in as green a state as will possibly do and avoid its heating and becoming mouldy. In this way it best retains its succulence and flavor; and the nearer in both these respects it approaches to grass in its green state, so much better is it relished by all kinds of stock, and so much the more nutritious it undoubtedly is. The best farmers, on the Connecticut river, and where they are extensively engaged in the feeding of cattle, have within a few years been accustomed to put their hay in the barn in a very green state and after a slight making. They deem it of the first importance that it should have no foreign dampness adhering to it either of dew or rain; but they do not object to its heating slightly in the mow from the fermentation of its natural juices. They are of an opinion that this even renders it the more palatable for the cattle; but wetness either of dew or rain is altogether injurious to its quality: produces sourness, and mould, and renders it innutritious, unfit for the use of cattle, and extremely pernicious to horses. The English farmers think their hay is better for a slight heat in the stack.

Two things in the curing of hay are to be particularly attended to. The first is to secure it from wet. The effect of wet upon hay is like the effect of water upon tea to extract all its strength and flavor. For this reason the practise of some farmers of mowing in the rain by way of saving time, and suffering the hay to remain wet and entirely saturated with water in the swath, under the impression that it would suffer no injury though it should remain so twenty four hours, proceeds on very erroneous opinions; and is to be strongly condemned. The practice likewise of cutting grass when a heavy dew is upon it, is, on the same grounds to be disapproved, excepting that in this case that it is very soon stirred and shaken. We should prefer, excepting that we might sometimes find that it compelled us to the loss of too much time, never to have a swath mowed but when the grass and ground are perfectly dry. The grass is not mowed so easily when dry as when wet. It requires more strength and the edge of the scythe suffers more; but the grass, which is cut when perfectly dry and the ground under it likewise being perfectly dry and warm, is made with so much more quickness and ease, that this consideration, which will go far to balance the supposed or actual advantages in the other case.

The second important point is to avoid getting the hay too dry, and stirring it so much as to shake off the leaves. These constitute the most palatable and nutritious part of the hay; and this is particularly likely to happen in respect to clover, which if very much dried and shaken becomes little better than so many sticks. Clover can be well cured in cocks, without any turning, but that of reversing the heaps.—This method has been often tried and with entire success. Salt is always to be applied in these cases at the rate of a peck to a load; and to all English hay the addition of salt to the amount at least of four quarts to the load is always to be recommended.

Spreading out, as it is termed, is an operation that should be done by a most careful hand. Clover hardly admits of this when green, and, if attempted when dry, the best parts of the hay are sure to be shaken off. Other kinds of hay however, cannot after mowing, be too carefully opened and too evenly spread; not a matted handful should be left that is not thoroughly separated and shook out. Hay at night, if it can be done, should never be left in swath or in windrow; but put up at first in small cocks and afterwards made with no more shaking about and spreading than is absolutely necessary to dry it. We have already extended this article beyond our intentions and yet have not exhausted it. We commend it to our brother farmers, not presuming that we can instruct them; but hoping that we may at least draw their attention to a subject of great importance in husbandry; but which we think has by no means as yet received sufficient consideration and care.

H. C.

LEGISLATIVE ACTION REQUIRED TO AID AGRICULTURE.

No. I.

Agricultural Professorship.

To the Editor of the Farmers' Register.

Airfield, July, 1836.

Sir: The devotion of your useful journal to "the improvement of the *Practice* and support of the *Interests* of Agriculture" has been beneficially felt throughout the State. The improvement of the *practice* embraces an extensive and diversified field; but the *interests* of agriculture are, perhaps, more ramified; since they are, either directly, or indirectly, connected with almost all the other interests of society. Is not agriculture the nursing mother of them all? And have not her interests been, not only too long neglected, but wantonly oppressed, for the benefit of others?

May I not ask, what practical, beneficial, and *separate* measure has our Legislature ever adopted to promote these interests? At the last session they were asked by an Agricultural Convention, to make a beginning—1. To appoint a Board of Agriculture for the purpose of superintending and supporting these interests and recommending subjects for legislative action—2. To establish a professorship of agriculture in the University, in accordance with its original design, and the intention of the founders of the Literary Fund—or, 3. To defray the expense of an agricultural tour through the Union, for the purpose of inspecting and embodying the most profitable and economical practices, pursued by the best husbandmen in other States; to be laid before our people for their information. Only *one* of these measures was asked for at that session; and it was hoped, that, at any rate, the least objectionable of them would have been adopted. Your readers who take a lively interest in this subject know with what indifference the memorial was treated. One of the persons designated to sustain the memorial before the "Committee on Agriculture," did not wait on that committee, because he had privately understood that nothing would be done, and knew, from long experience, the futility of attempting to overturn settled prejudices.

It has been thought (whether justly or not I do not say,) that this result was mainly attributable to a jealousy of the *University;* as it was apprehended that any action on either of the alternative

propositions of the convention, would end in the establishment of the proposed professorship and experimental farm. It was asked in conversation, what claim the University had over any of the other colleges in the State?

Whether agriculture be regarded as a science or an art, it certainly admits of degrees of skill. The principles on which its whole theory and practice depend are to be learned; for, they are not innate, or born in us, like the germinating principle in the seeds we use. Their connection with several of the sciences is intimate; nay, in many instances, are borrowed from the sciences; and, in all, usefully illustrated by them. The ignorant, but successful farmer owes that success to his industry in *imitating* others, or, to the knowledge he has acquired by observation and dearly-bought experience.

It is proposed, by means of a professorship and experimental farm, to impart to such youths as desire it, both *theory* and *practice*. It would be in vain for a professor of chemistry or natural philosophy to attempt, usefully and successfully, to teach his class either of these sciences by mere oral explanations from his chair, unaided by the dumb, but more efficient instruction of an apparatus. And so it is in agriculture—where experiment is the great expositor. It is not so important that we make every experiment with our own hands, as it is, that we know the principles upon which each is made, witness, and carefully note the *modus operandi* and the results. Few proprietors in the south till their own soil; and, if, instead of trusting the mode, &c. of doing it to the presumption of uninformed, self-sufficient agents, we would plan every thing and supervise its execution ourselves, our graineries would be better filled and our lands rapidly improve. But, what an amazing difference would exist in our present condition, if, in youth we had been carefully instructed, both in the principles and practice of our vocation! How many disappointments and bad crops would have been avoided! How many once fruitful fields would have been saved from sterility and abandonment!

I doubt not but that you have been amused at the ignorance, curiosity and surprise of a person with beard on his chin, when he examined, for the first time in his life, the crops and all the appurtenances of a farm. There are many persons in Europe who have never been beyond the walls of their native city; and there may be some in this country who have spent their days in seaports and at sea. Such an individual may be very learned and accomplished, if you please; but, with what profound ignorance would he embark in farming or planting! He would have to learn even the names and uses of every thing. As all would be new to him, time and study and careful observation and an imitative talent to boot, would be necessary before he could make a living. Although few are so ignorant as this; yet, the majority of the young men among us are less informed than they might be, about what is passing around them, and which is of the most importance to them in their future rural pursuits. They have been otherwise engaged, and it has not been fashionable to direct their attention to any thing so low and vulgar! I concede it to be true, that every farmer's son knows the name and use of every thing on the farm before he begins to shave, and can contract with an overseer and have a crop made in the *usual* manner. But, how many of us have been instructed in the nature and characteristics of soils—the skilful use of artificial means to increase their fertility or renovate it when exhausted; to alternate crops advantageously—to cultivate in the most improved and profitable manner such as may be best adapted to the soil and to circumstances: in short, how many of us have been taught to apply the unerring principles of science to the details of our business, and have been enlightened by the recorded experiments and practices of the present and past ages? Would not a knowledge of chemistry, geology, mineralogy and botany have done us, and through us, our common country, more substantial good than all the Latin verbs and nouns the whole of us ever conjugated and declined in our lives?

I am sure there is no *ne plus ultra* to human genius and enterprise: and, perhaps, you will think so, if you but contemplate all that has happened even within your own time. Guided by the increasing lights of science and the dexterity of art, have not the improvements achieved by man, in nearly all his vocations, outstripped the visions of credulity itself? The extension of old, and the discovery of new principles, with their brilliant results would astonish the most sanguine, as well as the wisest philosophers of any other age, if they could reappear upon earth. Need I recount the victories of *genius;* the wonders of *invention;* the splendid, herculean achievements of *enterprise* that so signally characterize and adorn the proud epoch in which we live? It is, indeed, an age of "successful experiment." And, shall it continue to be said, that every other interest but that of agriculture has been fostered and encouraged, as well by legislative action, as by associated wealth, and is moving onward with constant and increasing celerity?

In the midst of this unparalleled excitement and energy, it would have been strange if the impulse had not been communicated to the agriculturist: and we see him, measurably, roused from his lethargy, both by the novelties of the day and the increasing demand for the productions of his industry. The operation of this stimulus upon individuals of his own profession has produced improvements that are slowly spreading abroad; carrying conviction wherever they go, that husbandry is susceptible of a vastly wider range of usefulness and profit; and, if properly cherished by government, is destined, soon, to occupy the most dignified and honorable place among the pursuits of man.

The disadvantages under which individuals labor in making the experiments necessary to develope facts and principles, so essential to "the improvement of the practice of agriculture;" the tardiness with which *favorable* results become generally known and acted upon, and the fact that unfavorable results are hardly ever known beyond a circumscribed circle, have created in the minds of many intelligent citizens, an anxious desire that the Legislature should take "the interests of agriculture" under its special patronage and protection. These considerations induced the meeting of the convention which assembled in Richmond last winter: and I am gratified in believing that the subject, though so unceremoniously "laid on the table" by our law-makers, continues to occupy its relative importance, and excites an increasing de-

gree of public solicitude. Indeed, it seems impossible, but, that, every mind endued with reflection and patriotism, must participate in this solicitude; and, especially, when the wretched condition of our husbandry is compared with its intrinsic importance to every other interest, and with the declining power and glory of the commonwealth! Why is it that such armies of our citizens semi-annually abandon the land of their nativity and all its hallowed recollections—carrying with them that mass of intelligence, wealth and enterprise which subdues the wilderness and makes it blossom as the rose? Is it not because of the impoverishment of Virginia, and the neglected and humble condition of her agriculture? Is there a land on earth with a finer climate, or more natural advantages and resources, or with a soil more susceptible of the highest state of improvement? All our staples are of the first importance; and, when cultivated on rich lands that have never been exhausted, or, that have been highly improved by the skilful use of artificial means, yield a *profit* even greater than is derived from the most fertile soils of the west, except, perhaps, the cotton and sugar lands. This may be doubted by many; but, of its truth, I am thoroughly convinced by the results of actual observation. I am inclined to the opinion, that, if two farmers, with precisely equal, but ample, means, were to commence the same time on equal quantities of land; the one in the richest *woodland of the west*, the other in any favorable and improvable part of Virginia, and were to live for twenty years at the *same* expense, hoarding the balance of their incomes, the Virginian would have the most money at the end of the time; *provided* he adopted the most improved system of ameliorating his soil and cultivating his crops, &c. His land would be continually improving, and would not, in that time, have reached the highest state susceptible of improvement; though its production in quantity (which is rather improbable) might equal, if not exceed that of the other. The difference in the *prices* of his marketable articles and of his necessary purchases would swell the surplus of the Virginian. Would not the cost of moving and making settlements on the new lands of the west, if wisely expended in improving those abandoned, make the latter, in most cases, most valuable and desirable? However, it has been "testified" by the best and wisest man that ever lived, "that a prophet hath no honor in his own country;" and eighteen centuries prove the truth of the remark. How many migrate under the influence of this fact, it is unnecessary to enquire; for, multitudes leave us with no other than a pecuniary object, leaving behind an ample and unoccupied arena for all their means and enterprise, if they were only contented, and would believe so.

But, what hope is there of arresting this flood-tide of depletion, unless the Legislature shall, at once, take agriculture under its protection, elevate it to the honor of a place along side of the most favored arts and sciences? One half of the sum annually wasted by them in listening to the vain and unfruitful oratorical displays of the young lawyers among them, would fully meet the expenses of a professorship and pattern farm. But the execution of this, and the adoption of such other measures as may, upon reflection, seem calculated to instruct us in the best modes of culture and management, could not involve an expense worthy of a moment's consideration by those to be benefited by them. If the fear of incurring the displeasure of the people prevented our delegates from "taking the responsibility" last winter, they have now time to agitate the subject among their constituents, and collect their sentiments. And I invoke your aid, Mr. Editor, and that of every other friend of the good cause in the State, in rousing the public mind to a proper consideration of this subject, in all its interesting aspects. I assure you I feel no interest whatever about it, beyond that which every other citizen who loves Virginia ought to feel. It concerns us all, no matter of what calling; whether land-owner or not.

The legislative authority of almost every State in Christendom has been exerted directly in promoting agriculture: and why should Virginia stand, a solitary exception; and that too, when her husbandry, in all its departments, is comparatively, so far in the back ground? Most of our law-makers are, themselves, *interested* in the subject; but no feeling of disinterestedness or mawkish sensitiveness about providing for their *own interests* ought to restrain them; since that interest is common with that of their constituents. The fear of censure for expending a few dollars in so good a cause is unworthy of any man who has been honored with the confidence of the people. Is there a man among us so contemptibly mercenary as to refuse to contribute a few cents, (say one or two cents per head on the population of the State,) to place the primary interest of the Commonwealth on a footing of greater respectability and advancing improvement?

If it be asked, what can the Legislature do? I answer, comply with the request of the memorial of the convention.* Let them look into the laws of other countries as well as those of our sister States—collect all their measures in aid of husbandry—examine into the results of them—and adopt such as may be thought to be suited to our wants and circumstances. Nor would it be unavailing, respectfully to weigh the merits of every plan that may be suggested, and expend a small sum in testing the practicability and utility of the best of them. If I had access to the necessary books and documents, I would, cheerfully, lay before your readers, an abstract of what has been done elsewhere. Perhaps some of your correspondents may be more fortunate in this respect than myself, and can spare the time to do it. Many persons would like to see such a statement, and it might have some effect in stimulating both the public mind and the movements of the Legislature. I do not know that the public libraries at the seat of government and our literary institutions have been, or have not been, enriched by the books and documents containing this information. If they have not been, it is a reprehensible omission that ought to be supplied at once.

But, it has been asked, what superior claim the University has over the other institutions, to a professorship of agriculture and a pattern or experimental farm? The answer is so obvious, that the question plainly indicates an improper jealousy of that valuable institution. Is not the University

*Would it not be well for the Farmers' Register to re-publish the simple propositions or requests, as set forth towards the close of the memorial alluded to? See Far. Reg. vol iii, page 625, February No.

the highest school of learning in the State? Does it not embrace the widest range of science? Is it not supplied with the most extensive library, apparatus, &c.? Is it not the resort of the greatest number of youth, and regarded as best calculated to add the finishing touches of education? And is not its position most central, as well as in as fine a section of country as any in the State? Such an experiment as that proposed, could not, therefore, be so fairly made any where else, if gentlemen insist on calling it an *experiment*. If local advantages are to result, they would, necessarily, be enjoyed at any other place. Though I do not agree that these advantages will be confined to that place; for, the benefit of them will rapidly spread to the remotest corners of the State and far beyond them. Every valuable developement of science and experiment will instantly fly through all the channels of communication, and enlighten the mind and practice of the husbandman in his rural and most sequestered abode. The young men who annually return to the bosom of their families and friends, will also bring with them liberal and enlightened views and a cultivated taste for rural pursuits. Husbandry will be elevated to its just rank, and the learned professions (gratuitously so called,) will no longer monopolize so much genius and talent, nor be the graves of so many of our young men. Public sentiment will be gradually turned in favor of the certain profits, the real comforts and quiet joys of agriculture. The streets of your cities and market towns will be less crowded by eager and desperate speculators; by gay drones and fashionable voluptuaries.

When this happy change shall be effected, may we not confidently hope that the rich resources of our State; the enviable advantages of our climate, soil and location will be more justly appreciated—that the ancient glory and renown of the Old Dominion will be relumed—and, that our society will find its strongest and most congenial cement, and substantial happiness, in the dear land of our fathers.

Yours, respectfully,

CLAIBORNE W. GOOCH.

No. II.

Board of Agriculture—Agricultural Tour.

To the Editor of the Farmers' Register.

Airfield, July, 1836.

The Legislature is asked to establish, upon a plan similar to the one adopted in New York, a Board of Agriculture. It might consist of one member from each congressional district; to be elected for two years, either by the people or the General Assembly. They ought not to be permitted to serve more than two years at a time; and, perhaps, it would be best for half of the Board, annually, to consist of new members. This accession of fresh zeal every year, to be tempered by the reflection and experience of the old members, would be attended with good results. Such a Board could not fail, at least, for some years, to be highly beneficial to the interests of agriculture. It would diffuse throughout the State much useful information, and inspire a livelier interest in rural pursuits. It might be the instrument of embodying and disseminating a knowledge of practices and improvements that too often remain long confined to particular neighborhoods, and dissipate that cloud of prejudice in favor of ancient courses, that so much retard the success, and diminish the profits of the husbandman. Thinly scattered, as we are, over an extensive territory, we are, generally, without the means of comparing principles and practices, or of learning, in any authentic form, the results of such experiments as the means and enterprise of individuals, even in Virginia, enable them to make. The *Farmers' Register* is a valuable vehicle for the communication of such information, I grant; but, only a few of the more wealthy of our population subscribe to that work; and still fewer employ its columns for that purpose. And, when they do so, it is too frequently in the form of anonymous communications, that seldom command that attention and credence, due to real and respectable names.

But, the *prejudice* against every thing new, however valuable, in husbandry is as deep-rooted and general, as it is pernicious and ridiculous. Something is necessary, to exterminate it, if possible, from the minds of *men*, and guard those of *youth* from imbibing it. Would not the eradication of this noxious weed be worth all the expense, both of a Board of Agriculture and an Agricultural Tour? Those who have the means of making experiments in a limited way, or step out of the beaten track of their neighbors are sure to be pointed at, as mere *book farmers*, and to lose reputation for good sense. Should they fail, even in *one* among many praiseworthy attempts to improve in tillage or management, they become, at once, butts of ridicule; their credit suffers, and perhaps their solvency is doubted. If they meet with success, it is ascribed to mere chance or lucky seasons. When new and valuable discoveries are made, they are disseminated with such a snail's pace, that it takes years for them to get beyond the neighborhood.

It is too generally believed that there is no art or mystery in husbandry; that it requires no education, and a very ordinary share of common sense and intelligence. Nay, more; it is the prevailing impression, and probably with two thirds of the people, that a well educated man, with a cultivated and expanded mind, is wholly unfit for agriculture! In what can this, most absurd opinion originate? May we ascribe it to the fact, that all our young men, possessed of these advantages, have been, hitherto, devoted to other pursuits; that, when they do settle upon farms, they leave the management of every thing to overseers; (who frequently can neither read or write!) or, if they undertake the management themselves, that, from not having had their minds, in their youth, directed to, and instructed in, the principles and practice of husbandry, they so often fail, and have to sell out; or, at any rate, blunder along, and spend half their patrimony, before experience teaches them the ordinary skill, and gives its consequent success? But, no matter to what causes such an impression may be owing, it ought to be removed. And is there any better way of doing it, than, for the Legislature to take agriculture under its protection, and elevate it in public opinion? It has been said, that the character and chief interests and pursuits of a nation may be ascertained by an examination of its laws. According to this test, what sort of an opinion do you think a stranger would form of us, after having read our code of

laws? Would he infer that we were almost entirely an agricultural people? or, would he incline to think us a community of litigant speculators and traders?

If our fathers have prodigally dissipated the fertility of our lands, yet, skill and industry have power to restore it. All the other bountiful gifts of Providence still remain to us; and their great value is daily made more manifest. Long experience and the example of other communities prove, that the means and enterprise of scattered individuals are insufficient, promptly, to develope the advantages of new improvements, and to change, in any short period, the immemorial habits and practices of a whole commuuity. Hence, it is very important, through the instrumentality of a *Board of Agriculture*, to concentrate, and then diffuse whatever valuable systems and practices that may exist in different parts of the State; and, by means of an *Agricultural Tour*, collect and disseminate a knowledge of those of our sister States. I grant that much of this information might be gathered from periodical publications. Bnt it exists in such detached scraps, mixed up with so much other matter, that, if the materials were accessible to individuals, it would require much time and great labor to collate and embody it in a useful form.

A Board of Agriculture would bring with them the results of their own experience as well as that of the most successful husbandmen in their respective districts. Their own discussions and comparison of opinions would elicit much light for the benefit of the public; and they would be enabled to recommend to the Legislature the wisest and most beneficial enactments, both to "improve the practice and support the interests of agriculture." In whatever light such a Board may be viewed, it seems to promise benefits that would justify its establishment. Perhaps it may not be necessary to keep it in existence more than a few years. When it shall have stimulated and aided the Legislature in doing something for the drooping interests of the cultivators of the earth; when it shall have roused into active being, and given a proper direction to a becoming zeal in the pursuits of husbandry, its duties may well be superseded by a *State Agricultural Society*, under the immediate patronage and support of the Legislature. That such a socieiy should be soon gotten up, need hardly be here suggested. I think it only requires to be proposed to ensure its organization the coming winter. May not the failure of a similar attempt heretofore, be ascribed to an improper organization and the want of legal aid? At that time the spirit of improvement in every thing else had not so far outstripped husbandry, as at present; nor did there exist so many urgent reasons to make exertions to increase the respectability and profits of the land owners, in order to keep them from migrating. At that time we had no public journal dedicated, like yours, to our uses, and calculated to keep together and reflect the value of such an association. When such a society shall be again organized, it is hoped that the officers and managers, and even its members will consist only of actual and practical farmers. To place the chief conduct of its affairs in the hands of any other description of persons, however elevated, by reputation for talent, by office, or by private worth, is to ensure its failure; to kill it, in the very act of its birth!

Let it be remembered that the Agricultnral Convention which met in Richmond last winter, adjourned *to meet again, on the second Monday in January next.* It is expected that the friends of this measure will take steps in time, to insure a full meeting, and to embody as much zeal and talent as possible; and go prepared to compare opinions and act with union and energy. It is contended that the farmers and planters have a right to demand that something should be done in their behalf. If the measures, to which I have so hastily and imperfectly adverted, be not approved, then, let better ones be substituted, having the same great object in view. I am confident that such, when properly understood, will be gratefully received by the whole agricultural community. That community cannot be expected to acquiesce much longer in delay and indifference; nor be satisfied with the poor excuse, that "nothing can be done for their interest, more than by measures that collaterally support it." But my confidence in the patriotism of the Legislature, and in their disposition to do any thing for the public good, when they see clearly how it may be done, is such, that I am sure the members will, between this, and the time of their meeting, reflect seriously on, and enquire into, this vital subject, and be prepared to legislate wisely and efficiently upon it.

I am, very respectfully, yours,

C. W. GOOCH.

For the Farmers' Register.

ON THE USE OF THE OSAGE ORANGE (MACLURA AURANTIACA) AS FOOD FOR SILK WORMS.

Some months ago the Farmers' Register contained a translation of an interesting article by M. Bonafous, giving the result of an experiment on feeding the silk worm on the leaves of the Maclura. Although the authority of that gentleman may be regarded as decisive on any matter connected with the culture of silk, yet as many substitutes for the mulberry have been successively used and discarded, it was reasonable to suppose the Maclura might share the same fate. On trial however, I find it to answer all the purposes for which M. Bonafous recommended it; and as the silk business is becoming an important branch of industry of the United States, I am induced to detail, in corroboration thereof, the result of my own experiment.

In the month of May, I had a few thousand eggs to hatch; and during the three first ages the worms were fed exclusively on the leaves of the Maclura. At the commencement of the fourth age, they were divided into several parcels, with a view of giving to each a separate kind of food. About one third were continued on the same—the native mulberry was given to an equal number—a portion of the balance was fed on the Maclura and Chinese mulberry indiscriminately—and the remainder on the Chinese mulberry alone. During the process, I could not perceive that the worms manifested any partiality between the leaves of the Maclura and those of the Chinese mulberry: if they evinced any, it was certainly not in favor of the latter. But they greatly preferred *either* to the leaves of the red mulberry, some of which I would occasionally lay on the shelves, where they would suffer them to remain

until compelled by hunger to eat them. On the contrary, when these which had the red mulberry leaves assigned to them, were furnished with a few of the Maclura, they would collect around the latter, and devour them with avidity, before they would begin to feed on their accustomed diet.

The relative value however of the Maclura and Chinese mulberry for the production of silk, was only to be fully determined after the formation of the cocoons. It may be recollected by those who read the article of M. Bonafous that he regarded the Maclura as chiefly valuable for feeding the worms during their early age; that subsequently they should be supplied with the mulberry, their natural food: and that though the former would produce silk of a fair quality, yet it would be inferior and in diminished quality compared with the product of the mulberry. I find this to be true as it regards the Maclura and Chinese mulberry, so far at least as it respect the size of the cocoon; but the Maclura is at least of equal value to the red or native mulberry. The worms fed on the Chinese mulberry, spun cocoons weighing from thirty to forty five grains—those raised on the Maclura and Chinese mulberry combined, made their balls somewhat lighter on the average—while the weight of those obtained from the Maclura and red mulberry respectively, was about equal, and still less than either of the preceding. The quality of the thread for the manufacturing purposes, I am unable to pronounce upon, not having yet submitted specimens to a competent judge. The cocoons were nearly all of a pale straw color.

If the value of the Maclura consisted only in furnishing food for the silk worm, it might from its extreme hardiness and consequent exemption from late spring frosts, be deemed worthy of planting: but when to this, other important uses to which it may be applied are superadded, it appears to present irresistible claims to our favor. I may therefore be excused for dwelling more at large on its merits, which have as yet scarcely begun to be appreciated, or even known.

In many parts of the United States the scarcity of timber has for many years been sensibly felt. Still our forests continue to disappear; and to mitigate the evils of this alarming destruction, efforts have frequently been made to substitute live for dead fences. It is believed however that hedges have not to any considerable extent answered the purposes of an enclosure. After all the trouble and expense bestowed upon them, they have in most instances finally dwindled away, and been rooted out. Hence it may be inferred that the plants used in their construction, have been too feeble in their constitution and therefore incapable of attaining the necessary size and developement. A plant that would unite these requisites would be a desideratum. Now it has been confidently asserted that the Maclura will make a most substantial and impervious hedge—a fact which cannot well be doubted by any person who will take the trouble to examine its manner of growth. The branches are thickly set, and the lateral ones almost uniformly take a horizontal direction: they are moreover armed with a number of sharp and very rigid spines, which do not disappear, as has been stated, after one or two years, but permanently remain. The plants grow with such vigor, that it would only require a few years, under careful treatment, to rear an excellent hedge from the seed. To those who are fond of the ornamental, it may also be recommended for the lustre of its foliage, and the magnificence of its fruit.

Hitherto, the means of propagating the Maclura have been rather limited. It grows but indifferently from cuttings, and not with certainty from slips of the root. The only mode which can be depended on for extensive increase, is by the seed. These have been seldom perfected on this side of the Mississippi, owing partly to the small number of trees which gentlemen have introduced into their grounds, and also to inattention to the fact that they are diœcious. With a knowledge of this characteristic, there is no difficulty in having them to bear abundantly. There is one growing in my garden, now seven or eight years old, which has matured its fruit for a year or two past, and which would have borne considerably earlier, had not the staminate plant perished, which was ordered with it. The one subsequently obtained was feeble in its growth, and slow in flowering. Last year the number of seeds which ripened, amounted to many thousands. These readily vegetated in the spring, and the seedlings are now growing in nursery rows as finely as could be desired.

I regret that I have not been able to compress my remarks into a smaller space; but before concluding, I will take the liberty to suggest to some of our enterprising seedsmen the propriety of obtaining a parcel of the seed of the maclura from its native forests. They may be gathered in any desirable quantity on the Red river and in the contiguous parts of Arkansas. It is the practice now to compass sea and land to discover a new vegetable for our tables, or a flower for the parterre; and while the seeds of these productions meet with a ready sale, in consequence of the increased taste for horticultural pursuits, it is not to be doubted that a considerable demand will also be found for those of a plant which will equally contribute to the ornamental and the useful.

T. S. P.

Goochland, 7th Month, 1836.

FRAGMENTS OF MY MEMORANDUM BOOK.

[The following article is formed of parts of the memoranda which the writer was formerly in the habit of hastily noting down, whenever his very limited opportunities for agricultural observation occurred, and which observations were generally directed to particular localities more by the compulsion of other circumstances, than by the mere object of seeking such facts and information as were found. The record was commenced and kept (in a loose and irregular manner,) solely for the writer's amusement, and at first designed to meet the eye of no other person—and the length of time that has since elapsed will suffice to prove that publication of these parts was not then designed. Upon looking over them recently, they appeared to contain nothing that ought to give offence to the individuals referred to, and the views, and even the mistakes of the writer, may attract the notice of others to points deserving more full and correct statements. Several of the more important parts of the notes were before published in the 1st and 2nd vols. of this journal, un-

der the signature of "A Gleaner"—and if these remaining fragments are of no other use, they may suggest to readers who have better opportunities to travel, and to converse with farmers, how easy it would be for them to note down more important information, and to furnish to the Farmers' Register communications that would be far more interesting and valuable.]

Charles City, November 27th, 1836.

* * * * * None of the farmers, yet met with, use green clover in any way as food for working horses—and all consider its use would be extremely injurious to them. This certainly agrees with the opinions of my overseers, who have never permitted me to adhere long to even the partial use of green clover, though mown 24 hours before being used. They would insist that it weakened the horses, though their corn was not diminished, and they still had dry fodder once a day. I attributed their opposition to prejudice and ignorance: but here I find very intelligent and experienced farmers all concurring in the same opinion. Yet it is certaln, as we see in English agricultural works, that green clover (aided by tares perhaps for a short time) is the long food of work horses as long as the mowing season lasts: and also that the amount of grain given is diminished considerably while clover is eaten. Can climate cause this great difference in practice? Or is our's altogether founded on mistake?

Mr. W—— T—— regularly harrows his corn field flush, (with a straight toothed square harrow, such as would cover seed wheat most effectually,) when the corn plants are high enough to want the first weeding (say 6 inches.) He finds no damage caused to the corn, and its tillage and cleaning much aided by the operation.

On the 28th, proceeded to Curles' Neck, (Henrico,) a peninsula of very uniform soil and character, bounded by James River, and two creeks, on three sides. It consists of several thousand acres of arable land, and is in seven or eight separate farms, formerly held by as many distinct proprietors. But, unfortunately for the improvement and value of the land, and for the public interests, 5 of these farms have been drawn into the gulf of a single rich man's estate. A perfect land-killing business now must be expected to follow—which was bad enough during the owner's life—but will be now worse, as the whole property (except its profits for a certain time,) is bequeathed to an infant, and for nearly 20 years this and all the other lands of this large estate must be butchered at the discretion of overseers.* The comfortable and handsome mansions are already going to destruction; and it would be useless to attempt to save them by repairs, as the owner can more cheaply suffer useless buildings to rot, than to preserve them. Our country presents every where the ruinous consequences of the division of farms, and the destruction of their value by being cut up into several pieces, no one of which is fit to live on: but here is equal destruction of value, in prospect, from the reverse operation—the accumulation of a number of fine farms in the possession of a single owner.

The soil of the whole peninsula, (or *neck*, which is our provincial name for such situations,) with some exceptions, is a mellow brown loam—a rich neutral soil, deep enough for ploughing of any power. It has generally, (since good farming was commenced here) been ploughed as deep as the team could effect, say 7, 8 or 9 inches—and the soil would permit still more. No doubt the original fertility of the soil was very great—but a long continued course of the common close cropping and grazing, and shallow ploughing, had reduced the soil to a low product, and mean appearance. Some enterprising proprietors began deep ploughing, and tried gypsum on clover; and found such remarkable benefit from all, that the land was rapidly and profitably improved. Now, though brought by bad management below its best state, this body of land is certainly the best that I have seen below the mountains, and of highland: and in situation and soil, may be considered as among the most valuable lands in the state. Yet the average sales of the several tracts last bought were not much higher than $20 the acre. I should suppose it well worth $40.

The rotation generally adopted here is as follows:

1. Wheat on clover lay, ploughed deep when broken, and again shallow before sowing.
2. Corn, for which the previous winter's manure is all used.
3. Wheat, on which clover is sowed.
4. Clover, not mowed, and but little grazed, and ploughed in August for the next crop of wheat.

This rotation agrees in general with that of Shirley, except the substitution here of corn for oats. Theory seems to approve the different mode of applying the manure, which is heaped and fermented as much as time allows, and carried out for the corn crop—thus having its benefit earlier than at Shirley, by one crop in the rotation. But I was told by Mr. M—— S——, (to whom I am indebted for most of the information obtained here,) that they would prefer keeping the manure for the wheat, but for the impossibility of providing labor to apply it during that very busy season. Very few cattle are kept, so that vegetable manure passed through the stables and barnyards, or ploughed in on the fields producing it, forms nearly the whole means for sustaining and improving the land under this apparently scourging rotation. Gypsum aids the growth of clover in a remarkable manner, and has been heretofore used generally, and perhaps every field has at some time had its aid. But here and elsewhere in lower Virginia, this manure is more rarely used now than formerly, which seems to make it doubtful whether the profit always more than repays the expense.

No lime has been used at Curles' Neck. A small experiment made with shell marl had good effects, as I was told; but I did not see the land, or the marl. This manure is found in the neighborhood, at Malvern Hills. The best land, forming the greater part of Curles', is certainly a neutral

* In this supposition the writer was mistaken. Curles' Neck has continued under the general charge of the gentleman who had temporarily assumed it just before the time of the above notes, and who is one of the joint owners of the income of the whole estate for a limited time, that has not yet expired: and to his sound knowledge, and skilful management as a farmer, is due the then unlooked-for result, that the downward course of the system of management has not only been stayed, for a time, but the previous good culture and improvement of soil restored as much as existing circumstances permitted.

soil, and could derive no benefit from the neutralizing power of calcareous manures, which is their most valuable effect on worse soils: but no doubt the other properties of those manures would prove highly beneficial here, and on every other soil not already calcareous.

Twice ploughing the clover lay, produces a better crop of wheat than once. This is also Mr. C——'s opinion: but he thinks the single ploughing which he adheres to, has more than compensating advantages in better securing the fertilizing power of the clover turned in. Certainly, sound theory seems to support this opinion; and the authority of Arthur Young, and the practice of good farmers in England, had taught me to expect from the single ploughing, a better succeeding crop, as well as more fertilization. Young denounces ploughing clover lays more than once, on any soil clean and light enough to prepare for wheat in that manner.

A singular practice has prevailed here to some extent. From so few cattle being kept, there is always a large surplus of coarse food and litter, the only use of which is to be converted to manure: and to aid this object, the farmers here often receive cattle from the neighboring poor lands, and support them free of charge through the winter. As a matter of mere economy, I doubt the propriety of this practice—as the food consumed by a cow would have been worth more as manure, than the excrement left from it, after supporting the animal with its nutritious parts.

Heard of no lime having been used as manure, between Shirley and Richmond, and only one small experiment with marl, at Curles'. I did not see the spot, nor the stratum from which the manure was taken. Saw a fine body of marl, (which I think is gypseous from appearances) at Evelynton, on the border of Herring Creek, in Charles City. No use has been, or will be made of it by the owner, who however is zealously engaged in hunting for and digging gold ore, in Spottsylvania. He will be a lucky miner if he derives as much profit from his gold, as he loses by neglecting the marl at his place of residence.

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York county.—The farm called King's Creek, on York river, and on the creek of the same name, is the finest and most beautiful body of land in this part of the country, under the most execrable management. It is 1800 acres: some back land high and poor—but the greater part, on and near the river, is a level sandy loam; deep, rich and neutral soil—part nearest the river bank highly calcareous, from the quantity of oyster shells which have been on the surface before the settlement of the country. We had no means of obtaining any accurate information as to products—and the miserable cultivation of the fields, and the close grazing, forbade our seeing the full worth of the land. This estate sold a few years ago, for $40,000, in 8 yearly payments, without interest. It then had a splendid dwelling home, which has since been burnt. *

* I should *guess* that this land (excluding the poorer half) would now make 25 bushels of corn, and 12 or 15 of wheat—and much more if put under a proper rotation, and decent management. It was supposed that if now sold, this place would command $25,000. At even $30,000 I should consider this estate very cheap, if it was not in the oyster country: but *there*, where every advantage of good and cheap living is found—good navigation and choice of markets—rich soils, or the best manures for improving poor ones—a curse seem to fall in every body, and scarcely a profitable farm, or thriving farmer, can be heard of.

Belfield, below, is another excellent farm, though inferior greatly to the last. This has 1000 acres, a dwelling house and farm houses of sufficient extent, and middling value, and sold for $8,000. The quality and appearance of the land very like King's Creek, though of less value and fertility. Here there is abundance of rich marl, which is used to very good purpose, though not very extensively as yet. The owner is Mr. R——— M——, a lawyer who resides in Williamsburg, and gives up the management of his land almost entirely to his overseer. Fortunately he has a good one, (from Charles City,) and this farm seemed to me the most profitable for the investment, not only in present returns, but in the system of improvement, and future prospects, of all that I viewed or heard of.

Porto Bello, the land of Mr. B——, and the two last mentioned estates, lie on the best waters of York river for obtaining the finest oysters. Vessels are always waiting (during the season, from September to May) for loads, to be carried to the north, and a number of boats are engaged every day in catching oysters for their supply. The great quantity opened for the inland market, on the adjacent landings, furnish lime that is now used largely to improve the lands; and the "oyster crackings" make a still better manure, which had accumulated in large quantity, but has latterly been all used. The crackings are the thin parts of the oyster shells, which are broken in opening them, and are small enough to be used without burning, and thus retain all the animal matter which fire destroys. Lime is also used by Mr. B——, and others between Porto Bello and Williamsburg—and to as much advantage as can be expected on the three-shift and grazing rotation. Saw marl on Mr. B.'s land so easy to apply, that it would be cheaper than burning lime, though the shells were already in heaps on the field. The marl certainly was poor and sandy, and therefore he had thought it not worth using: but it was so accessible, and well situated, that after once opening a pit properly, a mule could marl the first 30 acres in as many days. 100 to 120 bushels of slaked lime is considered here (as also among the good farmers on James River) a full dressing, for safety: but though that opinion is doubtless correct, as to *caustic lime*, still that quantity cannot give half the calcareous matter the soil usually requires, and that 400 bushels of good marl would give. The lime will therefore need renewal—and in comparing the cost of using marl and lime, perhaps the cost of the latter ought to be doubled, to be fairly opposed to marling.

Heard that R——— in Gloucester, the seat of the late G——— P—— is now offered for sale for $7000. It has 700 acres of very good land, and a building which has been the most costly, as well as largest private mansion in Virginia, but is now so much out of repair, that it would be cheaper to pull it down and build another house out of the materials.

* * * * *

In Williamsburg, which is half town, half country, much putrescent manure is collected from the

streets, principally the pure dung of animals, for the use of the surrounding farms. This is generally "preserved" as it is supposed, or, as I consider, subjected to the greatest possible waste, by being heaped alone, and exposed to rain and sun, until wanted. Under these circumstances, decomposition, and the evolving of the gaseous products, must proceed continually and rapidly. The excrement from the Lunatic Hospital has for half a century been thrown into large pits, and never has been removed, except into the air by decomposition, and only was covered deep by earth, when the pits became a nuisance. If the rich marl, which is on the spot, were used to mix regularly with these excrementitious matters, they would never become offensive, and would be preserved as a body of the richest manure. If I lived near, I would give an annual rent of $50 for the use of this manure, which nobody will now meddle with.

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Dr. M—— of Weyanoke has continued for 5 or 6, or perhaps more years to cultivate the same field in corn—but with peas planted between the rows of corn. Last year, about 250 bbls. from this field or (as his overseer thought) about one third of the whole, was found rotten when gathered. There seemed to be sufficient reason to believe that this was caused by corn being so long continued on the same ground. But I have heard of a much longer uninterrupted succession of corn, on either very rich land, or where there there was the worst and laziest farming—and no such evil was attributed to the plan. Indeed, I had thought that corn, different from all other grain, might be cultivated forever on the same land without diminution of product, provided the land was kept as rich as at first.

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When passing through the light ridge land of James City, Mr. ———— pointed out a field which had been ploughed a number of years ago, in August, "as deep as two horses could break the land," and that so much injury had been sustained, that the field had never recovered. The soil was like the neighborhood in general, a poor silicious sand, on a similar white sub-soil, and not marled.

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PISE VERSUS MUD WALLS.

To the Editor of the Farmers' Register.

Columbia, S. C., July 30, 1836.

An article in the 3d No., 4th vol., page 172, signed "Philip St. George Cocke," seems something like a declaration of war against me; but as I am too old to fight with any prospect of victory, I must try the power of manifestoes and explanatory notes, which, I think, in nine cases in ten, a much better way than the carrying on war in the usual way. In the negociation for peace thus entered into, I must take heed lest the garrulity of old age exposes me again to *the reproach of writing too much.* Besides this reproach, which I consider unmerited for the reasons which I shall state in due time, Mr. Cocke adds to all he says, a spice of irony, which I am not conscious of deserving.

The reason that induced me to write at all on *pisé* for houses and fence walls, is, that I saw in your Register that many persons were at a loss how to supply the deficiency of wood for fencing. In the State in which I live, the use of the common rail worm-fence is a disgrace to an old, settled, and civilized country. I therefore thought I was doing good in showing that fences of a very superior kind could be made without incurring any great expense. In doing this, I thought it necessary to caution the readers of my article on pisé, against confounding it with what are usually called "mud walls," which I still think are very inferior to those made of pisé. *Hinc illæ lachrymæ.* I certainly knew not, at the time, that Mr. Cocke or any one else in Virginia had been constructing walls and houses of mud; and although I find now that his mode of constructing mud walls is very much like that of which I expressed disapprobation, it cannot be said that I attacked that gentleman in any degree at all. I had heard and read of the mud houses of the poorest people in Ireland, and had seen in this place three or four mud houses constructed by an English gentleman. On these specimens of the art, I founded my reprobation; for the houses did last but a few years, and as they had been a source of derision, it was most undoubtedly not improper in me to state that pisé work was very different, and superior in duration, and perhaps neatness of appearance.

Knowing full well how much of the preaching of religion and morality is practised before the desired effect is obtained, even in these two objects, on the goodness of which there is no dispute, it was not very culpable in me to have written as much as I did on the advantages of pisé structures, particularly as my first piece was not at all noticed. "But," says Mr. Cocke, "I think he has there in his zeal for pisé, opposed the influence of his name to the introduction of the more simple and humble, but not less useful system of mud walls," &c. This is a severe cut; for, so far from making any calculation on the influence or weight of my name, it must be very obvious that I quoted the authorities which I did, as well as the antiquity of this kind of construction, because I was well aware that my name could not avail much in persuading gentlemen to try this mode of building; and that it might, without these quotations, have been attributed solely to visionary and theoretical notions of mine. But let us not pluck the mote out of our neighbor's eye before we have taken the beam out of our own. And here Mr. Cocke uses the weight of his own most undoubted highly respectable name, to which he superadds four plantations, with a number of mud houses and walls, to which he, without mercy, adds Gen. Cocke, and the mud walls erected by him. This seems certainly enough to crush me to atoms; and notwithstanding all this superincumbent weight, I can stir a little yet.

So far from being revengeful, I will return good for evil, and heroically help my opponent with another arm against me. I have read many years since, but in what book, or of which of the many travellers in the east, I cannot now remember—but I certainly have read, that one of these travellers, on visiting the ruins of the Tower of Babel, found that it had been constructed chiefly of mud mixed with straw; and another states, that the straw was placed between the different strata of mud, much in the same way as Mr. Cocke describes the constructing of his walls. I do not vouch for the truth of these travellers' accounts, but only that I

read them. Here, then, is an antiquity for the mud walls established beyond any other mode of building, in which Mr. Cocke has greatly the advantage over me and pisé structures.

Notwithstanding all this, I venture to question Mr. C.'s opinion, that his system of mud walls "is more simple and not less useful" than that of pisé work. I cannot see how any kind of construction can be more simple than that which is made with the earth merely as it is found after removing a surface of a few inches. There is neither water nor straw used in the pisé, whereas both are necessary in the mud structures: besides which, much labor must be used in the mixing and properly tempering of the materials. Now surely a piece of work, formed of one single material, used without any preparation whatever, but merely the putting of it into a sort of mould made of planks, and then beaten with pestles, is more simple than that which is compounded of earth, straw and water, which must be well wrought before the compound is applied to the intended structure. Yet I admit the possibility that the construction with mud thus prepared may not require more work than the pisé, the pounding of which is somewhat slow. As regards the comparative usefulness of the two, for durability must constitute a part of usefulness, I must claim the palm for the pisé. The other contains much vegetable matter, which must inevitably rot in time, when the walls must thereby be much weakened, and finally destroyed. The pisé being constructed of pure earth, clay and sand, or gravel, is incorruptible; and if well made at first, nothing but violence can destroy it. If, with my present experience, I had been the architect of the Tower of Babel, I should have had it constructed of pisé.

In conclusion, I most cordially, and in all sincerity, offer to Mr. Cocke, the hand of peace and friendship, and beg to be considered by him only as an humble fellow-laborer in the field of usefulness; and I am truly glad to learn that so much has been done towards substituting more durable materials for fencing and house-building, to the unsightly and inefficient ones hitherto in use.

N. HERBEMONT.

[We feel sure that Mr. Herbemont is mistaken as to the tone, and still more as to the *extent* of the censure of his opinions conveyed in the communication of Mr. Cocke: and if that assurance had not been felt, the expressions would certainly not have been admitted in this journal. We are confident that there was no irony meant in speaking of the weight of the name of Mr. Herbemont, and that Mr. C., in common with all who read the Farmers' Register, must feel respect for that name, even when opposing opinions sustained by it. Both of our correspondents are aware that all of us who are considered as "riders of hobbies," however useful we may be to the public, are sure to be more or less laughed at by all the world: and those who belong to that valuable and much slandered class, should not object to having a little added to the tax which they thus pay, by their being sometimes laughed at a little by each other. In this good humored warfare, our older friend has placed himself on equal ground at least; and it is hoped, that nothing nearer to personal controversy may be offered, in this or in any other case.]

LIME AND CLOVER IN MARYLAND.

To the Editor of the Farmers' Register.

Harford Co., Md., June 26th, 1836.

The farmers in this county are liming their lands to a considerable extent. The way in which it improves land, as explained in your essay on calcareous manures, is understood by very few in this section of the country. Until I read your essay, I used lime as I did my barn yard manure; and I believe the most of the persons who used it, have used it as I did, as I see the most of them take all off, and return nothing to the soil, except the very scanty allowance of their barn-yard manure; and the clover roots by those who sow clover, as they mow or pasture it close, and then plough for wheat. Indeed, some graze off close in the forepart of the season, plough in June, and re-plough in August and September, which I consider still worse, particularly for a light soil.

Still I am of the opinion, that lime is partially an alimentary manure for the most of crops, and particularly for clover, as I find it will vegetate and grow on my poorest old fields after they have had but a moderate dressing of lime, say fifty bushels per acre, which I consider enough for the first dressing on old worn out lands. Marked spots, where no corn nor rye scarcely grew the first and second years after liming, the clover looks as well, or nearly so, as on the rest of the field. And I find wheat to grow nearly, or quite as well, after turning in a crop of clover on similar places in other fields, as in any other part of the field; and thus, I conclude, that lime will make clover grow without the aid of putrescent manures, and will be of great benefit to wheat when combined with vegetable matter.

J. R.

MR. GOLDSWORTHY GURNEY'S SAFETY METHOD OF LIGHTING MINES.

(From the Evidence taken before the Committee of the House of Commons on Accidents in Mines.)

Has it ever occurred to you to consider whether mines might be lit under such circumstances as to do away with the necessity of the moveable lamp?

The subject has been one which I have lately considered a good deal, in consequence of being engaged again in experiments of a similar kind to those of 1822; I have recently made a series of experiments, for the Trinity House, on artificial light; and the results of these experiments, and observations connected with them, induce me to believe it possible to light coal mines without taking flame at all into mines. In a few words, I will state, that I think it capable of being done by reflected light. In these experiments I found artificial light may be produced, so intense that when placed in the focus of a parabolical reflector, it will throw a distinct shadow at the distance of eleven miles. Now, as light is capable of being concentrated, reflected, and refracted in any angles, or in any direction, or in any quantities, I think it possible that such light may be reflected into mines, subdivided, and passed through the galleries, in sufficient quantities and intensity as to enable miners to work far better than by lamps of any description. The light itself, and the combustion to produce it, could be placed above the shaft, in the open air. If, however, from mechanical difficul-

ties, such as obstructing parts in the way of its passage down the shaft, it is possible that the light might be placed in some safe part of the mine itself, where fire-damp is never found, and from thence be reflected and refracted through the various parts of the mine. I have made experiments with this view, and have found light capable of being reflected, in various directions, with simple and inexpensive reflectors; the first reflection requires a true parabolic reflector, but afterwards plain and simple surfaces will do. Possibly, the whole mine and galleries may be all lit by a single light, if not very extensive; but if seven lights of the first order be placed in the focus of seven true 12 inch parabolas, and arranged within a circle of 3 feet diameter, which they may be, I firmly believe one of the longest mines might be most effectually lighted in every gallery. No one can judge of the power and management of this light who has not seen it, or possibly conceive its practicability to the subject before us. I need not go into explanation of the manner of doing it. The committee will remember that, as the angle of reflection is always equal to the angle of incidence, we may throw the light in whatever direction we please; by this means we may turn it round a corner at right angles, or in any angles suited to the drifts the mine happens to be cut into. The practical difficulties connected with this plan chiefly, I conceive, are those arising from obstructions in the galleries: one, for instance, is the air-doors, which are necessarily used for ventilation; there is no difficulty, however, in such case in placing a piece of plate-glass in some particular part of the door, so as to admit the passage of the light through it, or a second light may be brought in an opposite direction; again, if the galleries are so low that there is not room for the light, coal wagons or miners, to pass together, it is possible so to widen them, or enlarge them, that there would be a sufficient space for a sufficient quantity of light to pass; it may be passed through very small openings by strong concentration, and afterwards diverged as may be necessary.

Would it not be attended with great expense?—No.

Less than the ordinary mode?—I am not prepared to say exactly, but I think it would not be more expensive than the present mode. In case the light is not required to be very great, I think a light of less intensity might be used, with advantage, that would be less expensive than the present oil-lamps. A very simple but powerful light, is about to be adopted by the Trinity Board for light houses, which, by way of distinction, and in reference to the place where it was discovered, has been called the "Bude Light." This light produces an intensity 140 times that of the present Argand burner; this light, therefore, may be used where the ramifications of the mine, or greater extent, does not require the first order, namely, the lime light. In some cases, the light from the common Argand burner, placed in a parabolic reflector, may be sufficient, and in that case it certainly would be cheaper. I am of opinion, from the experiments and investigations made at the Trinity House, that the light from lime, and also the Bude Light, is less expensive than that of the ordinary light, taking quantity and intensity into account, which may be sub-divided to equal intensity with the first; the intensity of the one is 290 times greater than the other, and the intensity of the second 140; thus one is capable of giving the same quantity as 290 Argand burners, and the other as much as 140.

The term Bude Light has no application to the pecular manner in which it is produced?—It is a term simply used to distinguish it.

From what is it derived?—It is produced by striking nascent carbon, evolved in the combustion of oil, resin, or similar bodies, with oxygen gas.

You have spoken of difficulties in the introduction of this new system of lighting in the mines of this country; apply your mind for a moment to the difficulties which might arise in the mines not having above two or three feet depth of seam?—I think such difficulties are to be overcome by inexpensive boring or widening to admit the light to pass; in such a drift a stream of light, highly concentrated, of six inches diameter, would be ample, and whether it passed by the side or the top of the gallery, it matters not. A large quantity of light, by simple means, might be concentrated in such case, and passed along such an opening, and afterwards diverged in larger galleres, if such was indispensable. These are points upon which I think the committee willl find other persons more capable of giving information on than myself.

Supposing a light is required to be in a straight line for a mile, there would be no difficulty in obtaining a sufficient light at the terminus?—The light at the distance of a mile would enable you to read the smallest print. If it is reflected two or three times in that distance through a circuitous passage, you would lose very little, if you use good reflectors made of speculum metal. The quantity of light lost by such reflection is very trifling.

The question related to the casting of light upon one object at the distance named?—So I have answered it; it is of little consequence whether it be straight ahead, or at the end of a curved or angular gallery.

In case that light is then to be divided into fifty differeut directions, so as to suit different galleries, what would be the consequence as regards the terminus?—The result would be, that the light would simply be reduced fifty times in quantity; it would be divided into fifty portions; it would then be still stronger than the strongest Argand burners; and I beg to be understood as meaning the Argand burner used on the tables of private families, not the little oil burner of the safety-lamp. I will make an observation here which may be important, namely, the stream of light may be sent through the various galleries, and when it arrives at the situation where the men are working, every man, with a little reflector or refractor, as may be determined on, may take that portion of light which may be intended for him, and no more, from the great stream, and thus limit him the quantity of light that he may abstract from the stream; which portion he may at pleasure direct wherever he pleases on the work before him; so that instead of a lamp, he would work with a little diverging reflector, or refractor, which he would carry in his pocket, perhaps of the size of half-a-crown.

Do you not think that the experiments of scientific men might be better made in the mines

themselves, than they could be in their own laboratory?—Certainly; if a principle is established, it rests as a matter of mechanical detail, or of mechanical situation and position, to know whether it can or cannot be applied, practically, with advantage. Sir George Capley informs me that he used the principle of reflection to throw daylight to some men who were working a deep well. It had a beautiful effect, and answered the purpose perfectly. His reflector was nothing more than a piece of tin plate. The daylight is not sufficiently intense; we cannot focus it so as to be passed through the galleries of mines.

In your opinion, would the experiment be better conducted by placing the light above the shaft, or at the bottom of the shaft?—It would depend on the depth and size of the shaft.

Assume 200 yards in depth?—In such case above; you get at the materials and apparatus for forming the light better; the distance of 200 yards has very little effect in diminishing the light; reflected light does not obey the same laws as radiated light; radiated light diminishes as the squares of the distances, but reflected light does not; this is contrary to received opinions, but I am satisfied it is correct, from the observations I have lately made.

You have not supposed any difficulties in the application of this light, beyond those already stated, which the committee understand to be the interruptions occasioned by stoppings or trap-doors in the mines, or the extreme sub-division of the reflected light?—I have: there are others, but I think of minor importance, which can only be justly appreciated in practice.

The shafts of the mines are placed at right angles, that is, they are driven along, and they begin at the further end, and then work upwards; is there any difficulty in transmitting the light at right angles?—Not any difficulty whatever; you may transmit the light in any angle you please; it may first be thrown down a shaft, and then sent into any angle, upwards or downwards, or on one side or on another.

Suppose there be a space of two or three feet left on one side, or on both sides, of the carriages conveying the minerals along the galleries, the light might be transmitted independently of the space occupied by the carriages?—Certainly.

Or through a similar space above the carriages?—Yes.

And you propose to obviate the difficulty of passing through the trap-doors, that means in the mines, by the insertion of glass in those doors; what is the smallest size you would consider sufficient for that purpose?—It would depend upon the situation in which the door was placed in the mine; if in the first gallery, where you wanted the full stream or supply of light to pass, you would require twenty inches diameter; when doors occur further on, in the division of light, perhaps, three or four inches in diameter would be sufficient.

Would that be sufficient to light a gallery at the distance beyond the door many hundred yards, if twelve feet wide?—Certainly. There is another valuable natural fact that I would mention here: the stream of light, as it passes through the air, is refracted by the atmosphere, and thrown in all directions several yards, with an intensity sufficient for practical purposes. My house at Bude has a long gallery in it; I passed a stream of reflected light through that gallery; every bed-room entering into the gallery was sufficiently illuminated in every part for a person to pick up a pin. The light in the bed-rooms was refracted light, from the reflected light passing through the gallery. I conceive that unless men are working at some distance from the stream of light through a gallery, a reflector would be scarcely necessary for them. Dust, floating in the atmosphere, reflects a good deal of light sideways.

Would the accumulation of dust upon glass so inserted in one of the trap-doors, be a serious impediment to the light?—Not practically, because it could be easily wiped away.

Are you aware that a boy is generally stationed to take charge of those doors?—Yes.

And of course, he might have instructions to keep the glass perfectly clean?—Certainly.

EXTRACTS FROM THE REPORT OF PROFESSOR DUCATEL'S SURVEY OF MARYLAND.

Geological Examination of Dorchester, Somerset, and Worcester Counties, on the Eastern Shore of Maryland.

These three counties, comprising more than one-third of the territory of Maryland, east of the Chesapeake bay, though presenting but little variety in their mineralogical and geological features, are yet not devoid of interest in these respects, while in others they offer subjects of consideration of the deepest importance to the prosperity of the state.

The most prominent geological feature in this district is a succesion of sandy hillocks, in what are termed the upper portions of these counties, being a continuation of the ridge dividing the courses of the waters that empty themselves to the east into the bay of Delaware, and to the west into the Chesapeake. These hills of sand are themselves arranged in ridges, running generally north-east and south-west, diminishing in elevation towards the southern extremity of the peninsula, forming a curve on its eastern boundary, and presenting every appearence of a series of sandy beaches produced by successive retreats of an ocean. No organic remains of any kind are known to have been found within this portion of our territory, excepting a deposite of oyster shells at the head of Taylor's Creek, two miles above the fork of the Nanticoke, and ten miles below the fossiliferous deposite occurring on the north-west branch of this river, and previously referred to as the newer pliocene formation. This deposite is overlaid by soil six feet in depth. The shells contained in it are much in the same condition as those occurring in the accumulations supposed to have been made by the aboriginal inhabitants of the country; *i. e.* the valves are separated, and are not, so far as perceived, associated with any other marine shells. They are, however, perforated and covered with *serpulæ*, as if they had lain long, after the death of their inhabitants, at the bottom of the sea. But they are at a great distance from any actual oyster beds, and are in a more advanced state of disintegration than the fossil oysters heretofore observed; whilst, on the other hand, they are covered, as aforesaid, by a thick stratum of sand, no where else remarked to overlie Indian banks.

The lower portion of the peninsula lying in Maryland, embracing Dorchester, Somerset, and Worcester, is a low level country, mostly a deposite of stiff clay, excepting on the margin of the rivers and creeks, where the country is wavy and the soil sandy. The sand hills, on the borders of the rivers, are always situated on their south or south-eastern sides, and extend but a short distance inland. In some instances they form distinct ridges or waves of sand, running in various directions; sometimes parallel with the course of the river, and when occurring at the extremity of necks, transversely, or across the points. The intervening necks, sloping gently to the south and south-east, terminate in extensive marshes, which in high tides are frequently entirely submerged. In the midst of these marshes there are occasional sand hills, or hummocks; but rarely of any great extent.

The sameness in the geological constitution of the necks of land, just referred to, is evinced in the digging of wells, from which this section of country is exclusively supplied with water for domestic purposes. At a depth of from ten to twelve feet, penetrating through the stiff clay, there is invariably encountered a stratum of clean white sand, with gravel, varying from one to two or three feet in thickness. Out of this an abundant supply of good water can be obtained; but beneath it there is always found a soft black mud, with an offensive odor, and filled with decayed vegetable matter, composed principally of a coarse grass, similar to that growing upon the present marshes. In some places this mud is reported to be of great depth. It does not appear, however, to have ever been accurately sounded; but in one instance, already alluded to in a previous report, at Cambridge, it was traversed, and is stated to have been found overlaying a fossil deposite, the shells of which are referable to the older pliocene marls.

Another remarkable feature in the geology of this country is the occurrence of a ledge of water-worn stones, composed of quartz and sandstone, constituting gravel and boulders of various sizes, from twenty to several hundred pounds in weight. These stones were first observed between Todd's Point and at the head of Little Choptank; they were afterwards found scattered over a narrow zone of land, between Monie Creek and the Manokin. They are said to occur at the head of Back Creek, on the south side of Manokin, and were finally again observed near the mouth of Marumsco Creek, on Pocomoke Bay. At this last mentioned spot—being a knoll of dry ground in the marshes, protruding into the bay—the beach is covered with these stones, washed out of the bank. All of them are a close grained sandstone, with small veins of quartz, the sandstone being of the character of that occurring on the Blue Ridge, different from that constituting the *white rocks* at the mouth of the Patapsco, but similar to those larger masses that are found strewed over the surface in the upper parts of the Eastern Shore of Maryland, in Cecil county. These erratic masses form, with the exception of the bog iron ore—which will be presently more particularly referred to—the only stony bodies that occur in the three Eastern Shore counties, now under examination.*

* A ledge of submarine rock is said to be off Todd's Point; and another to Benoni's Point, on the Talbot side of the Choptank.

Such are the great geological features of this section of country. A more detailed account of its physical geography will now be given under separate heads, for each of the three counties embraced within it.

Dorchester County, lying between the Choptank and Nanticoke rivers, requires perhaps more than any other county on the Eastern Shore, the assistance which would necessarily be afforded by an accurate topographical survey, in adopting measures to bring into operation her natural resources. Placed between two large rivers, her facilities for sending the produce of her soil to a market are yet not great, and mostly confined to the least productive part of her territory. The central portion of the county, most susceptible of great and permanent improvement, and even at this time the most productive, is deprived of an outlet for her agricultural staples, corn and wheat; and the no less valuable source of wealth, which she possesses, in her magnificent growth of timber. The natural channels of egress through the Blackwater and Transquaking have long since failed to be available in any thing more than a limited degree, these rivers serving now rather to increase the obstacles to the navigation of the bay into which they empty. Fishing Bay, their common estuary, offers scarcely more than five feet of water, at high tides, over a deep and extensive mud flat, which it is utterly impracticable to remove. The inconvenience arising from this cause is felt by a large portion of the county, and has suggested the application to the legislature, for the opening of a canal communication between the Blackwater and the Choptank. Such a canal would but partially remedy the inconvenience, whilst a more comprehensive view of the benefit to be derived, points to the practicability of connecting the Nanticoke with the Choptank. This is believed to be entirely practicable, and the advantages to be obtained from the connection of these two rivers, by means of a canal traversing the heads of navigation of the Blackwater, Transquaking and Chicamacomico—a project to be effected at a trifling expense—are great and obvious. A communication of this kind would not only furnish an outlet for the already valuable products of the county, but could be used as a means of conveying to it those materials, such as marl, lime, &c. (of which an abundance would be thus brought within a convenient reach,) that are necessary in order to enhance the productiveness of its soil, and bring it into that state of improvement of which it is susceptible. Other advantages may be expected to accrue from the excavation of a canal in the direction just referred to; among which, not the least important would be to render it subservient to the effectual and thorough drainage of a large extent of country, at present uncultivable, and not only itself insalubrious, but the main cause of the unhealthiness of that by which it is surrounded. It would seem to be at all times a subject worthy of the attention of a government that wishes to increase the quantity of nutriment, as well as to improve the salubrity of a country, and consequently to augment its population and prosperity, to employ suitable means to effect a complete drainage of every morassy district, within its dominion, of whatever extent. In the present case the proposed improvement forms, however, only part of a scheme of internal navigation that

might, it is believed, be advantageously pursued for the benefit of a large portion of the Eastern Shore of Maryland.

In the upper part of Dorchester county the soil is mostly a sandy loam, well adapted, with proper management, to the growth of corn, rye, and oats. This character of soil belongs more especially to those portions lying on the rivers, and extends, with very few exceptions over a narrow slip of land on the Choptank, as far as Hill's Point, on the bay shore. The neck between the Big and Little Choptank is a low flat country, mostly composed of a stiff clay soil, covered with a plentiful growth of pine, sweet-gum, oak and dogwood, but suffering greatly from a want of convenient drainage; an evil that might be remedied, and by which thousands of acres of land, now of little value, would be reclaimed and rendered fit for cultivation. With the advantages possessed by this section of country, in her now extensive deposites of shells on the river banks, her sea-ooze, together with her proximity and easy access to the marl deposites of Talbot county, it ought to become one of the most productive and flourishing portions of the state.

The necks and islands, forming the western and south-western portions of the country, likewise present us with low and level lands and a stiff clay soil, mostly well timbered with pine, white, black, and willow oak, sweet-gum, &c. The situations on the islands are delightful and generally reputed healthy.

Meekin's Neck, on the bay shore, is marshy, and this is the case of nearly one half of Hooper's Island, the extent of which is nearly fourteen miles in length, and from one to two in breadth; such portions of the island as are arable have a productive soil. At the head of Honga river and bay, there are extensive meadows; and where the soil, also a clayey loam, is cultivated, it is said, to yield abundantly. Bishops-head Neck offers the same character of soil and physical aspect. Throughout the whole of this district the depth of wells is rarely found to exceed ten feet, penetrating the clay to sand, from which the water issues, seldom perfectly clear, and occasionally slightly brackish.

At the heads of Big and Little Blackwater Rivers there are also extensive marshes; the country is very level, low and swampy; the soil a stiff clay; timber principally oaks and sweet-gum. Between the Blackwater and Transquaking, around Bucks-town, the country is more elevated, the soil lighter, with a growth of very large oaks and American poplars. The wells here are sunk to the depth of 12 feet, through clay, reaching gravel and sand.

Towards the head of the Transquaking, and between it and the Chicamacomico, the soil is a clay-loam, that would yield very good crops of grain, if properly improved. Beyond the Chicamacomico the country is more uneven, the soil lighter, sometimes sandy, the level of the country rising towards Vienna. Wherever the soil is stiff, it is covered by a heavy growth of oaks and gum.

Hurley's Neck, along the Nanticoke, south of Vienna, is a level stiff clay, well wooded, for the distance of about seven miles, after which it terminates in an extensive marsh.

No fossil deposites, similar to those occurring so abundantly north of the Choptank, have been discovered in Dorchester county, that would answer for agricultural purposes; but the large accumulations of shells found at Horn Point, at Oyster-shell Point, and other places, together with the deposite on Taylor's creek already referred to, might be made eminently serviceable if burnt into lime. The only mineral formations of any value are the deposites of bog-ore, at the heads of Transquaking and Chicamacomico, and on Reedy Creek, in the vicinity of Federalsburg. This ore is compact, heavy, free from phosphate of iron, and would probably yield from 40 to 50 per cent. of good metal. Some inclination having been manifested by an enterprising proprietor of an extensive deposite of ore, on the Chicamacomico, to work it in place, it was thought more advisable to recommend that it should be forwarded to the Baltimore market, where it would probably command from $3 to $4 a ton.

Somerset county presents, in its physical geography, as might have been expected, great features of resemblance with the county that has just been described. Its upper portions are very sandy and rolling—a succesion in fact of sand hills, gently inclining to the south, and terminating in a level deposite of stiff clay—as if at one time this part of the country had been a sea beach, from which the waters have receded to a considerable distance beyond the mud flats that formed at the same period of time the shallow bottom of of the ocean, and extended several miles from her shores. But what is here supposed to have been formerly an extensive mud flat, is now a populous country, in many places well cultivated, every where very improvable, possessing a productive soil, well timbered, and intersected by numerous creeks and rivers. These form the *necks* of the county, falling by an imperceptible slope into marshes many miles in extent, with here and there a hummock, crowned with some lofty pines, or a herd of grazing cattle looming against the horizon, to relieve the monotony of the scenery. The waters of the sound, by which these marshes are limited, are not seen, unless perhaps from the top of some hummock, and are only indicated by the occasional passage of some skiff, whose white swollen sails contrast agreeably with the luxuriant dark-green growth of these grassy plains.

Without having reason to believe that the waters of the Chesapeake bay have absolutely diminished, it is nevertheless true that the amount of dry land is increasing on the Eastern Shore of Maryland, by the filling up of creeks, rivers, and small bays, at the confluence of its muddy streams. The flats of Fishing Bay and Pocomoke Bay furnish us with examples of this, upon a sufficiently large scale, to produce, in no great lapse of time, very remarkable changes in the geography of this part of our territory.

That portion of the neck of land lying between the Nanticoke and the Wicomico, and contiguous to the former river, is within a narrow stripe, wavy and sandy, inclining moderately to the S. E. and terminating in marshes. The intervening country is level, with a stiff clay soil; this being the character, as must already have been perceived, of all those portions of the Eastern Shore, comprised within what are termed the necks. Generally speaking, the N. and N. W. parts of these necks, extending along the rivers and creeks, have

a light soil; in the central portions, the soil is clayey, and the S. and S. E. extremities are marshy; such is the character of Hungry Neck, between the Wicomico River and Monie Creek, and the description will answer for the Manokin Neck; though in this there does not appear to be the same uniformity in the character of the clay, which varies from a white and yellow stiff clay, to a black clayey loam, equally various in its degrees of productiveness and in the kinds of crops which it can be made profitably to yield. The upper parts of this neck are covered with magnifficent oaks, sweet gums, maples and beech; the lower portions support a growth of lofty pines, with an undergrowth of holly and sweet gum, and verging upon the marshes, that extend across the neck from the Wicomico to the Manokin, the pines are small, probably a new growth. The soil of the lands that terminate the neck—Big and Little Deele's Islands—on the north-west side, is a sandy loam, very productive in corn and sweet potatoes.

The aspect of the country between the Manokin and Annemessex, presents us with the usual almost dead level of clayey soil, covered partly with oaks, sweet gum, maple, &c. the pine predominating towards the lower end, and on approaching the marshes, the timber having been in a great measure destroyed, there remains but a scanty growth of small pines. The extensive marshes, called the Jericho marshes, form the extreme end of the necks, on the borders, and in the midst of which, are some few inhabited spots, more remarkable for their great salubrity, than, as might perhaps have been supposed, for the dreariness of their situations. To become convinced that health and comfort are sometimes found where they are very little expected, it is only necessary to pay a visit to the hospitable residence of Capt. Davy, at the head of the salt marshes of Jericho.

Annemessex Neck, whose soil and appearance would require the same description as that already given of similar portions of the country, is thickly settled towards the lower end, by a hardy population of boat-builders and boatmen; the latter supporting themselves principally by the sale of oysters, clams, and terrapins. These men may be instanced as further evidences of the healthiness of the marshy districts of country upon salt water. Whatever may be the influence of these marshes at a distance, judging from the appearance alone of those who inhabit them, or constantly frequent them, they are not the seats of disease; for it would be difficult, in any other section our country, to find a more hardy and robust set of men, than the residents on the Little Annemessex; and yet it is not to all that the praise of unexceptionable habits can be extended.

From the head of Little Annemessex, the eye looks over the broad expanse of salt marshes, reaching to the southern limits of our state—Watkin's Point being lost somewhere among them. Bounding these marshes to the north, there is a well wooded country, with a good soil and highly improvable, extending to the Pocomoke Bay and River, and comprising the district of Rehoboth. Marumsco Neck, towards the latter district, is also well wooded, the country level, and soil generally clay loam, in some places at the head of creeks more uneven and sandy.

Such is the account, and it will, it is believed, be found substantially correct, that may be given of the lowest portions of Somerset county. It has already been said, that the northern part of the country is sandy. It is especially so between Barren creek, and Salisbury; but from Barren creek, in the direction of Quantico, to Whitehaven, the soil passes from a sandy loam to the stiff clay bottoms, described as forming the principal soil of the necks. Along the Wicomico river, on either side, the soil is mostly sandy. On the eastern side of this river, and reaching from it towards the south, the soil varies from sandy, sandy loam to clay loam; and a northerly direction from Princess Anne to Salisbury leads successively over clay, clayey loam, sandy loam, and through a swampy district, to the sand ridges of the upper portion of the county.

The only mineral product of Somerset county is *bog-ore*, of which there is an abundant deposite, of excellent quality, at the head of Barren Creek. It has been raised in considerable quantity, and continues to be profitably extracted by Mr. Brattan, who delivers it at Baltimore for $3 the ton. A large supply of this ore might be obtained from this and other neighboring localities. It is also found at the heads of Back and Dividing Creeks; but samples examined from these places indicate an inferior quality of ore.

The mineral springs of Barren Creek deserve more attention than they have lately received. The waters have been analyzed, and were found to contain oxide of iron, soda, and magnesia, combined with muriatic acid. They belong therefore, to the class of alkaline chalybeates, are tonic and diuretic, and have been found eminently serviceable in bilious disorders. The well known curative properties of the waters, the comfortable accommodations at the springs, with the obliging disposition of the proprietor, and of the tenant, Mr. Levin L. Porter, ought to furnish strong inducements to invalids of the Eastern Shore of Maryland, to resort to them now, as they were wont to do in former times.

No fossil deposites, answering as marl, have been found in Somerset county; but a material almost as valuable occurs abundantly in various places, constituting those accumulations of oyster shells, believed to have been made on the site of ancient Indian settlements. The spots upon which these shells bank were observed, are, on the Nanticoke, at the mouth of Witipquin Creek, and at the Sandflea Landing; on the Wicomico, at Long Point, where there occurs one of the most extensive banks of the kind known, the shells therein, being deposited at the depth of from three to nine feet, extending nearly a quarter of a mile along the shore, and several hundred yards inland; on the Manokin, Maddox island and Fishing island are covered by similar accumulations; and on the Pocomoke, another occurs at Shelltown, about two miles above the mouth of the river. Banks of the same kind are found in other places, but of a more limited extent.

The value of this material has already been stated in a preceding report, but it cannot be too strongly impressed upon the farmers of the lower counties on the Eastern Shore of Maryland. *It is the principal agricultural resource which they possess, by a proper application of which they may double the produce of their lands.* In the upper

counties of the Eastern Shore, where the worth of the material is appreciated, it is made to undergo two operations: it is passed through a coarse sieve, in order to separate the black highly fertilizing mould with which the shells are associated, and the fine fragments of these; the coarse clean shells are then burnt into lime. The sifted article readily commands from three to four cents a bushel: the lime sells at from six to nine cents, according to its quality. By referring to the section "On the comparitive value of shell lime and stone lime," your Excellency will perceive that the difference in value, between the two articles, for agricultural purposes, is very trifling, whilst the difference in price is considerable. Can any farmer doubt that the discovery, on the Eastern Shore, of limestone quarries even of moderate extent, and to be used solely for the conversion of the stone into lime, would be of immense benefit to the country? The equivalents of such quarries are found in the shell banks that have just been indicated. They should no longer be neglected.

Worcester county has long felt the want of some parental assistance, to enable her to bring fully into action her natural resources. She has asked for three capital improvements, of which two have been reported necessary and practicable; viz. the cleaning out of the Pocomoke river, so as to render it navigable for flat-boats, at least about fifteen miles above where it is now available, or seventeen miles beyond Snow-hill, at present the head of navigation; and a canal communication between Sinepuxent Bay and the Delaware. To understand the value of these improvements, it is necessary to possess an outline of the geography of the county.

This county is bordered on the east by the Atlantic Ocean; but between this ocean and the cultivable portions of the county there is a prolonged sandy beach, varying from a few hundred yards to a quarter of a mile and upwards in breadth, and extending the whole length of the coast without a single outlet to the sea from Indian river, in Delaware, to the southern extremity of Chincoteague island in Virginia. Between this beach and the main land lies Sinepuxent bay, from one to four or five miles wide, and nearly thirty miles in length. It is a shallow sheet of water, navigable only to a short distance above South Point, at the lower end of Sinepuxent Neck. The entrance to the bay is reputed to be also very shallow. Sinepuxent Neck, about ten miles long, lies between Assateague or Trap Creek and Sinepuxent Sound, at the head of the bay. The produce of this neck, and of country on the Assateague, which, comprising the Berlin district, are amongst the most flourishing portions of the county, has thus to be sent down a long bay through a difficult entrance, to encounter finally the dangers of an ocean navigation in search of a market, whilst an easy, short, and safe transportation could be readily obtained. To effect this latter object, it has been proposed to connect Trap creek by the St. Martin's and Indian Rivers, with the Delaware Bay, inside of Cape Henlopen. The surveys for this substantial improvement have been made, and its easy accomplishment, at a moderate expense, demonstated.

The other improvement, solicited by Worcester county—the clearing of the Pocomoke—has likewise been found to be practicable. Viewed in connection with the canal communication just referred to, it acquires more importance than is at first sight apparent. The Pocomoke river rises in an extensive swamp, situated partly in Maryland and partly in Delaware, called the Cypress Swamp, from the profuse growth of this valuable timber, by which it is covered. The bed of the river, now obstructed by large trees, lying across it in every direction, passes through the heart of the county, dividing it into two nearly equal portions. Owing to the obstacles presented by the fallen trees into its bed, its downward navigation commences only a few miles above Snowhill, after which it is free for schooners over a distance of about twenty miles, to the mouth of the river in Pocomoke Bay, on the Chesapeake side of the county. It has been proposed to remove these impedients as far up as the use of the river is found to be impeded by this cause; and the advantages to be thence derived are shown to be considerable.—It would facilitate the access to a vast body of valuable timber, and to extensive deposites of iron ore of good quality; and by confining the waters of the river within their natural channel, it would effect the drainage of a large tract of land, now an almost impenetrable swamp, covering doubtless a rich and fertile bottom. These are interesting considerations, whose importance becomes enhanced by the fact of the practicability of farther connecting, by a canal navigation, the head waters of the Pocomoke with the St. Martin River, and its projected communication with the Delaware, thus establishing a complete thoroughfare through the county, from one bay to the other.

But to render this project of internal navigation complete, another improvement seems to be required. The mud flat in Pocomoke Bay, already alluded to, forms, as is well known, a serious impediment to the free egress from the mouth of the river, through the sound into the Chesapeake, and the inquiry has been made as to the possibility of removing it. Attention having been turned to the subject, the removal was concluded to be quite impracticable, as well from its nature as from its extent; being the natural effect of causes, that, as *they* cannot be removed, would be constantly giving rise to the same results. Whatever remedy might be partially applied would be therefore but temporary, very expensive, and would do but imperfectly, what, it is considered, can be accomplished in a more permanent, less costly, and more efficient manner, in another direction, namely: by connecting the Pocomoke with the Annemessex,—a project which has already met with the approbation of the Legislature, and for the performance of which an adequate sum of money has been contingently appropriated.

As this project was brought forward by an honorable Delegate from Somerset, it shows that this county is equally interested in it, as she is in another direction with the proposed connection of the Nanticoke with the Choptank. Viewing these projects connectedly, it will be seen that they are intended to establish an internal communication of some extent, calculated to bring into full operation all the resources of the country through which it will pass, enabling it to send its products to a market by the shortest route, and facilitating to it the means of obtaining the materials necessary for its improvement. Some advantages would likewise be derived from it in case of war, upon which the

belligerent spirit of the times compels us unfortunately to calculate as a possible event, by providing against the almost total non-intercourse between one section of the State and another. It forms a part of the duties of the undersigned to report to your Excellency, that the geological constitution of the country is highly favorable to the easy accomplishment of these projects.

The agriculture of Worcester is not in so favorable a condition as it might be brought to with a little more exertion. The soil is alternately sand and clay, or a mixture of both in variable proportions, and entirely deficient in calcareous matter. On the western side of the Pocomoke, the upper portions of this district that are not swampy, exhibit a succession of sandy knolls and ridges, with occasional basins, as it were, of level land, composed of stiff clay. The growth is principally pine and sweet gum; but on the branches, and in the swamps, there is seen a profusion of alder, maple, magnolia, kalmia, with the cypresses, of which two species were observed,—one deciduous, called the bald cypress, the other an evergreen. Between the Naseongo and Dividing creeks the soil varies from almost pure sand to a sandy loam, rarely, though sometimes clayey: the pine and sweet gum form the principal growth upon it. Along the margin of the river the soil is very sandy.

East of the Pocomoke the country is more swampy, the runs that feed the river being principally on this side. It is covered by a heavy growth of oak and cypress, and when cleared and drained shows a stiff clay soil. On some portions of the newly cleared land a young growth of papaw was observed, and in some places the less auspicious persimmon makes its appearance. Receding from the river the country is gently elevated, forming a low dividing ridge between the feeders of the Pocomoke and the waters of the St. Martin river and Sinepuxent bay. This ridge-land runs north and south, in the direction of the main road through St. Martins, Berlin, and Newark. Sinepuxent neck is a level tract of land, with a soil varying from sandy to clayey loam, occasionally passing to a stiff clay. The middle portion of the neck is tolerably well wooded; the extreme end, towards South Point, has been stripped of its timber. This, the Berlin vicinity, and the St. Martin district, are amongst the most flourishing parts of the county.

From Newark to Snowhill, on approaching the river and town, the soil becomes very sandy; and proceeding southwardly, as far as Newtown, the soil passes over a succession of sand hills, barely possessed of a soil. Towards the extreme end of the county, continuing along the Pocomoke, the country is more level, with a more substantial soil, said to yield good corn crops, and is much better wooded.

Crossing the peninsula in the direction of the dividing line between Maryland and Virginia, the country, at first level, soon appears gently undulatory, with a mixed soil, frequently a stiff clay, to within two or three miles of the sea side, when it becomes decidedly hilly; occasionally well wooded with pine, oak, hickory, and dogwood, having a good loamy soil, that could be made very productive in corn and oats. This sea side, as it is called, is an uneven country, stretching along Sinepuxent Sound, descending to it occasionally by a gentle slope, and sometimes encroaching upon it in the shape of extended marshes. The ridge-land, between the sound and river, is more level, soil more clayey and equally improvable, but no where in a good state of cultivation.

Sinepuxent Bay or Sound, to which reference has so frequently been made, forms a very important feature in the physical geography of Worcester county. The map A. appended to this Report, and furnished for its illustration by the Topographical Engineer of the State, exhibits its actual appearance contrasted with that it bears in the maps and charts now extant. Its condition, as a navigable sheet of water, has been fully described in the "Report of the Commissioners of the States of Delaware, Maryland, and Virginia, for the survey of the sounds between Cape Charles and Cape Henlopen," submitted last year to the General Assembly of Maryland. For present purposes it is only necessary to consider it as a narrow and shallow sea, interspersed with broken marshes and shoals, composed of oyster shells, mixed with clam, scallop and other marine exuviæ. It is interesting in a geological respect, and not a little so, as will immediately be shown, for the agricultural resources which it actually does and can more extensively be made to yield.

It is an interesting fact connected with the past and present condition of Sinepuxent Sound, that since the closing up of some inlets admitting the ocean into it, its waters having thus become comparatively fresh, the oysters and clams, by which they were formerly thickly inhabited, have died, leaving extensive beds of their exuviæ. These accumulations of shells, or *oyster rocks*, as they are here termed, seem to point at the manner in which similar deposites. now far inland, and constituting the shell-marl deposites of other districts, have been made. They are evidently the quiet and gradual accumulation of years, covered by a deposition of sand or mud, varying, according to circumstances, with the altering condition of the country where they are now found, and in some measure serve to explain the mode of formation of our fossiliferous beds. At no very remote period of time, they will probably furnish the prototypes of a geological formation, hitherto undescribed and characterized by the presence of a new species of zoophytes. In their present state, these oyster rocks afford an abundant supply of a very valuable material, already put to good account, but that ought to be much more extensively employed. They are now dredged, and their contents, consisting of oyster shells, clams and other marine shells, incrusted by a zoophytic production which has received the name of *Bunyan*, are burnt into lime. From this source not only an important and profitable branch of industry is created, but an invaluable product obtained for the improvement of the whole of Worcester county. The question has been asked, whether the lime obtained from this source is good? It may at once be answered, that it is as good as from any other quarter; but a more satisfactory reply will perhaps be found in the third section of this report. Indian shell banks also are found on Sinepuxent Neck where they have been partially applied, and always with the best results, which ought to be an encouragement to their more liberal employment.

The mineral product of Worcester county is confined to the bog-ore, occurring abundantly on the Naseongo, where it has been worked with varia-

ble success, being unfortunately too much mixed with phosphate of iron. A deposite of ore of better quality has been discovered on the Pocomoke, in the fork between this river and Duncan's mill-branch, and it is again met with in the swamps around Newtown.

A more general view of the application that can be made of the knowledge so far acquired, respecting the physical geography of the three counties just described, remains now to be taken.

Agricultural resources of the lower counties on the Eastern Shore of Maryland

The agricultural improvements of Dorchester, Somerset, and Worcester counties, fall far short of what they might be made to attain, by a better system of cultivation, and a more liberal employment of the resources which this section of the state possesses. But to effect a thorough improvement, the attention should be first directed to the congeniality of the soil, in each district, for that species of growth from which a crop is expected. Corn and wheat are the staple commodities of the Eastern Shore, but in the present condition of things, the latter is so precarious a resource, that corn may be said to be the principal produce and main dependence of the lower counties. And yet their various soils are capable of producing a number of other crops: rye, oats, beans, potatoes, (common and sweet,) and the root crops generally. But it is not only in limiting the variety of their crops, that the agriculturists of this section of country err; they neglect to take into account the peculiar susceptibilities of the various kinds of soil, to produce certain crops in preference to others; and thus an injudicious system of husbandry is followed, resulting most frequently in disappointment. On some of the light soils described as belonging to the upper portions of these counties, wheat cannot be raised, whilst these same soils may be made to yield profitable returns of corn, rye, and oats; it is therefore worse than useless to attempt to raise wheat upon such lands. The opinion that oats exhaust the soil, is an unfounded prejudice; for any system of rotation, with proper management, appears to be beneficial. Those parts, on the other hand, that possess a clay soil, with variable proportions of sand, admit of the alternate extraction from them, of corn and wheat crops, provided they be followed up by clover, cut and turned in, with lime; or if grazed not too closely.

Another popular belief, founded upon prejudice, is, that plaster will not act upon lands contiguous to salt water. It is not so. Lands, whether near or remote from the sea, upon which *gypsum* did not seem to take kindly, have been found, *after being marled or limed*, to derive the usual benefits imparted by this valuable material.

In some parts of Somerset, a small portion it is true, as yet, the crop of sweet potatoes is the main one, and is found very profitable, as is evident by the thriving condition of the small farms on Big and Little Deele's Islands; whilst intelligent farmers, in other parts of the county, have turned their attention advantageously to the cultivation of beans, peas, &c. But there is yet another growth that bids fair to become of great value to the agricultural interest of the Eastern Shore of Maryland, namely, the *palma christi*, or castor bean plant, sometimes known by the name of *mole plant*.

An attempt was made in the Report of last year, to excite the interest of the farmers of Queen Anne and Caroline counties, in behalf of this new crop. It is to be regretted that they have not extensively, if at all, availed themselves of the suggestion—the bean having increased in value far beyond the most sanguine anticipations. There ought to be, therefore, no further delay to the introduction of this growth as one of the staple commodities of Maryland. Without having been as yet able to ascertain the precise cause of the extraordinary demand for this article, within a few years, there is still reason to believe that the call for it will continue to be great; since, notwithstanding its extended cultivation in consequence of the high prices obtained in preceding years, it now commands a higher price than at any other former period. It has been stated that the oil expressed from the beans is employed in large quantity in the manufactories of England for greasing the machinery by which these establishments are put into operation.

The culture of the palma christi presents no difficulties. It is said to thrive best in good corn lands, yielding, according to the quality of the soil, from twenty-five to forty bushels per acre. The land requires the same preparation as for corn; and the bean is planted like this grain,—in hills on which two or three plants are suffered to grow; the subsequent tillage being also the same as that practised for corn. The most tedious part of the management of this crop is the gathering of the fruit, which forms a cluster with a pyramidal termination; the lower portion being occupied by the male flowers that yield no seed, and the upper by the female flowers. In the female flowers, the ovary, which is roundish and three-sided, supports three linear reddish stigmas, forked at their apex. The fruit, properly speaking, is a round capsule, with three projecting sides, covered with rough spines, and divided into three cells, each containing one seed. The flowers appear in July, and the seed ripens throughout August and September. If suffered to do so on the plant, the capsule bursts with considerable force, projecting the seed at a distance, and scattering it about the field. To avoid this is the only extra attention required by this growth, and this is done by anticipating the maturity of the fruit. The directions are,—to visit the plantation a little before the commencement of the ripening season, removing those clusters that approach to maturity, (which is known by a change of color, from grayish green to a light pea green,) and conveying them to the drying ground, where, by the effect of the sun's heat, they burst, and dislodge their seeds. The only preparation for the drying ground is to provide a small place, cleaned and levelled as for a threshing floor, upon which the clusters are scattered. It would be advisable to locate this spot in the neighborhood of the barn, or near a shed, so as to facilitate the removal of the plants, in case of protracted wet weather, to some sheltered situation. Transient showers of rain do not, however, damage it, otherwise than by blackening the seed, whereby its sale might be injured, although it does not diminish its productiveness in oil. The occupation of gathering having once commenced, it should be so arranged as to visit each plant twice a week, morning and evening, until the whole crop has been secured. It may then be sent to a market, where, at the time of writing this Report, it commands three dollars a

bushel; or, it may be made to yield its oil by the following process, as practised in Northampton county, Virginia.

The seeds are first to be thoroughly cleaned of dust, and of portions of the capsules that may have adhered to them. They are then introduced into shallow iron drawers, arranged on both sides of a furnace, where they are exposed to a gentle heat; the object of this first operation being to render the oil more easy of expression. From these drawers they are conveyed into a powerful screw-press, by the operation of which the oil is obtained. So far, however, the oil is impure: It must now, therefore, be transferred to clean iron boilers, previously supplied with water. As the boiling proceeds, the impurities that rise to the surface are skimmed off, and the clear purified oil finally makes its appearance, floating on the water. It is now carefully removed, and a second time subjected to the boiling process, with a very small quantity of water, until the latter liquid has been entirely dissipated. This is ascertained by taking out a small portion into a vial, and observing whether it preserves its transparency as it cools. Some care is required not to push the heat too far, as then the oil would acquire a brownish hue and a hot peppery taste, which would at all events unfit it for use as a medicine. One bushel of seeds yields about one gallon and three-quarters of oil, at an expense of about 25 cents a bushel, which is refunded by the sale of the *pumice*, found to be an excellent manure for corn crops. Acknowledgments are due to Mr. Smith, of Northampton county, Va. an intelligent and experienced planter of palma christi, and manufacturer of castor oil, in the vicinity of Eastville, for the information contained in the above paragraphs.

It is needless, after what has just been said, to expatiate upon the value of this plant. That the soil and climate of at least the lower portions of the Eastern Shore of Maryland are congenial to its growth, cannot be doubted. The praiseworthy example (crowned, it is believed, with entire success) has already been set to the inhabitants of Somerset, by one of the most intelligent farmers of the county—Col. Arnold E. Jones.

Persons well acquainted with the cultivation of rice confidently assert and believe, that there are many spots on the Eastern Shore of Maryland, well calculated to the production of this important agricultural commodity. Rice has been raised in Maryland, in the vicinity of Salisbury, at the head of the Wicomico, and a promising attempt, the result of which has not been ascertained, was recently being made opposite Vienna, on the Nanticoke. It would seem desirable to encourage such attempts, as further conducive to the practical illustration of the possibility of reclaiming a vast body of lands at present of little value. These are the marshes and cripples that occur on the margin of the large rivers on the Eastern Shore of Maryland. An examination of the actual condition of these marshes justifies the belief that they might, to a certain extent, be drained; whether sufficiently to be made permanently arable, or only to the extent of serving as more firm and safe pasturages, remains to be tried. It is thought that the single operation, though one not unattended with difficulties, of diverting a part of the course of the river so as to cause it to pass between the marsh and the mainland, would greatly contribute to their drainage. This appears from the fact, that their most elevated parts are those contiguous to the river, inclining moderately towards the firm land, adjoining which the marsh is always found to be the softest, and more liable to a total submersion. By insulating these bodies of land, always more or less miry, and thus establishing a drainage around them, it is possible they might eventually acquire sufficient consistence, without having recourse to embankments, to afford safe and valuable pasture grounds. The cripples seem irreclaimable by any other means than by embankments,—an operation deemed practicable by those who have given much attention to the subject, and who represent them as best fitted for the cultivation of rice.

Such are the agricultural resources of the lower counties on the Eastern Shore of Maryland, so far as the productiveness of the soil, and its susceptibility of improvement are concerned. It has already been stated, that the only incidental resource possessed by this section of country, is to be derived from the facilities of obtaining calcareous matter (in which the soil is essentially deficient) from the shell banks, oyster banks, and other sources already referred to. But before any hope can be indulged, that the inhabitants of this portion of the state will avail themselves of these means of bringing their lands into a higher state of cultivation than they seem to have any idea that they are capable of, it is necessary to remove a fatal impression, too generally made, that the lime derived from shells is of but little value. The result of the inquiries made to disprove this opinion, will be given in the next section of this Report.

An error equally fatal prevails among the citizens of Maryland, in reference to the counties that have just been passed in review—that they are as devoid of the interest as they have been believed to be of resources. It is hoped that the minute, and, at the same time, faithful account given of them—more minute than would otherwise have seemed necessary—will have a tendency to rectify the false judgment so commonly passed upon this portion of our territory and contribute likewise to cheer those of its inhibitants who have become dishartened at the present aspect of things, and who are too prone to believe that their industry could be better rewarded at a distance. Industry meets with its just reward every where; but the assertion is safely ventured, that the same amount of enterprise at home, would secure more comfort and happiness, than, under any circumstances, can be expected in a newly settled country, where all that is obtained is at the cost of solid enjoyments. The adventurous merchant and speculator may find a wide field in the "Far West" to satiate, if possible, his thirst for wealth; but the industrious farmer, on the tide waters of the Chesapeake needs no better patrimony than that which he already possesses. A soil easily cultivated, and very improvable, having the means of improvement at hand; the necessaries, and even luxuries of life in abundance; a temperate and healthful climate; a free and constant intercourse with a large commercial emporium, by means of a water communication reaching to the very door of his granaries; surrounded moreover by intelligent neighbors, and a peaceful and orderly population—such are the advantages of which he can boast, as a set-off against those of

any other section of our country. It is full time that he should learn to appreciate them himself.

REMARKS ON PROFESSOR DUCATEL'S GEOLOGICAL SURVEY OF THE EASTERN SHORE OF MARYLAND.

To the Editor of the Farmers' Register.

Eastern Shore, Maryland,
12th July, 1836.

The improvement of our condition, has become a matter of very serious import, to the farmers of the Eastern Shore. Many of us are much disheartened, and we have received no great encouragement from the reports of our geologist, Professor Ducatel. If he be right, that the lands we have heretofore considered the most valuable, "are best adapted to the growth of Indian corn," perhaps emigration to the fertile regions of the *far west* is our best plan, though at the hazard of being taken for abolitionists and gamblers, as we descend the river, and falling within the jurisdiction of Judge Lynch, a gentleman whose acquaintance we do not at all desire to cultivate. Men who exercise their minds in deep research and profound enquiry, rarely attend much to the common interests and concerns of life. The Canon Recupero passed much of his life on Mount Etna, and had formed some subtle theories as to its age and formation; but its capacity and suitableness for production, perhaps never entered into the range of his speculations. Professor Ducatel's inquiries were too much directed to the bowels of the earth, to pay much attention to the surface—minerals and marl seem to have been his ruling fancy. A little attention and a little instruction, of which he was entirely in the way, would have taught him that much of the soil which stands condemned by him as unsuitable to the growth of wheat, "and particularly adapted to Indian corn," consists of a fine chocolate colored loam, with a red clay bottom, and when under proper improvement and in a good state of cultivation, is equally adapted to wheat and Indian corn. The station of a geologist appointed by the State, is one of high confidence; his opinions of the character and capabilities of our country, abroad, hold an official weight, and ought to have been formed by his own observation, or the information of men in whom reliance could have been placed. This would have saved him from the propagation of the error, that our stiff white clay lands are the most valuable. The Professor would have found on the Eastern Shore, a concurrence of opinion, that they are not naturally fertile, but prone to the production of what is called here, poverty grass. If lands of this description be well ditched and highly manured, in a favorable season, they will produce a heavy crop of wheat; but they are not kind to the growth of valuable grasses, which, in all farming countries, is the life of agriculture. The late Col. Edward Lloyd of Talbot, whose memory is dear to his friends for qualities much higher than "his elegant hospitality," held a large estate in Miles River neck—it is bounded on one side by Wye River. Chew's Island is directly opposite, and the land on the river fields of the late colonel's estate, correspond with the soil of Chew's Island. In the middle of the neck, there is a large portion of clayey lands, white, stiff, and tenacious: these lands he brought to a high state of product by lime and other manures, and extensive and laborious ditching; but he always esteemed his lands on the river the most valuable, both for wheat and Indian corn. William Strickland, an English gentleman, (and I suspect a scientific agriculturist,) intending, in the year 1796, to visit the United States, received from the British Board of Agriculture certain queries, which he answered on his return. He relates, that for one-half of Chew's Island, £7 14s. per acre had been offered, and refused; and, at that period, he states, the piece of land on the Monocacy, in Frederick county, now one of the most valuable districts in Maryland, at £4 14s. Yet Professor Ducatel esteems the lands on Chew's Island, and those of the same quality on the Eastern Shore, as those best adapted to the growth of Indian corn. When the Professor shall have mixed a little more agriculture with his chemistry, he will change his opinion. Chew's Island, and many other lands of the same quality, had been greatly exhausted by neglect and imprudent agriculture; but they are indigenous to white clover, and they are capable of producing red abundantly with the application of gypsum; and by the addition of marl, they can, in a few years, be brought into a state of great fertility. On this subject, I speak from experience.

We have certainly many barren lands on the Eastern Shore, some of them sandy in the extreme; but for the extent of country, not greater than the steril hills and mountains of Lancaster, York, Cumberland, and Franklin counties, in Pennsylvania. Those of Caroline, on the east side of the Choptank, are perhaps among the worst. Yet Professor Ducatel found them "astonishingly productive of Indian corn." He had the rashness to recommend the introduction of palma christi; had the good people abandoned corn, and taken to palma christi, and the crop had succeeded, it would have deluged Baltimore in castor oil; had it failed, they might, with good cause, have regretted that Maryland had appointed a geologist, fresh from the city; and some sufferer, smarting under his loss, might have applied "empirical" to the scheme, a term equally odious to doctors and philosophers, and which none but an angry, or disappointed man, would ever extend to Professor Ducatel. Though I combat some of his opinions, I do it in the spirit of kindness: so far from detracting from his merits, I avail myself of this opportunity to proclaim them. When he first appeared among us, and we were told he was our geologist, and had come to discover the hidden treasures of our country, it produced that shyness and diffidence which the unlearned always feel for the wise; but his good manners and courteous address soon put us at ease. He talked the language of the country, not of the schools, and was communicative, familiar, and a little complimentary: he made some valuable discoveries, and excited a spirit of inquiry which has led to many more; and I speak the language of sincerity, not compliment, when I say the Eastern Shore of Maryland has derived solid benefits from the labors of Professor Ducatel.

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STEAM PLOUGH.

Some experiments were tried on Friday week at Red Moss, near Bolton, in the presence of Mr.

Handley, M. P. for Lincolnshire; Mr. Chapman, M. P. for Westminster; Mr. Smith of Deanston, and other members interested in agriculture, with a complete and very powerful steam plough, constructed by Mr. Heathcote, M. P. for Tiverton. About six acres of raw moss were turned up in a most extraordinary style, sods eighteen inches in breadth and nine inches in thickness being cut from the furrow, and completely reversed in position, the upper surface of the sod being placed exactly where the surface had been before. The possibility of ploughing by steam has thus been established, though, as the employment of the steam-plough, in preference to one drawn by horses, will depend on the comparative cost of the two powers, and on that of the two implements used, and as there are not at present any sufficient data for judging what the diffierence of the cost will be, it is not possible to say how far steam is likely to be applied to this department of agriculture. The plough of Mr. Heathcote, though a very powerful machine, appears to us to be much too complex and costly for common agricultural purposes, though we have little doubt that it might be used not only with effect, but advantage, in reclaiming large portions of moss land—such as the bogs of Ireland. Indeed, it is the opinion of Mr. Heathcote himself, that it would not at present answer to employ it in reclaiming a smaller portion of bog than 1500 or 2000 acres, though it may probably be cheapened and simplified, so as to make it ultimately useful on a smaller scale.

[*English Paper.*

From the Silk Culturist.

AGRICULTURAL JURISPRUDENCE.

At the late term of the Supreme Court of Errors, in this city, a question of agricultural jurisprudence was settled, which has often been the occasion of much controversy, and sometimes of a total interruption of that social intercourse and interchange of kind feelings and offices, without which neighborhood ceases to be a blessing, and actually becomes a curse. The question arose in an action of trespass for taking a portion of the fruit from a pear tree. The facts in the case were these. The trunk of the tree stood about four feet from the divisional line between the plaintiff and the defendant, and its roots and branches extended some distance into and over the defendant's land. The defendant plucked the fruit from the branches overhanging his land, to within about one foot of the line, for which the action was brought.

The defendant claimed, first, that he was tenant in common with the plaintiff, in the tree, and consequently had a right to take from the branches on his side of the line. Second, that if he was not tenant in common with the plaintiff, he was owner in severalty in that part of the tree which drew its nourishment from his soil, and that he had a right to take the fruit from the branches that overhung his land. Third, that if he was not owner of that part of the tree which is sustained by and overhangs his land, still he was entitled to the fruit growing on such branches. Fourth, that he had a legal right to remove the overhanging branches and projecting roots, they being a nuisance which he had a right to abate.

The court ruled the first three points against the defendant, and decided that the ownership of the tree was in the proprietor on whose land it was originally planted, and that he, of course, was entitled to all the fruit, though the roots and branches may have extended into and over the land of the adjoining proprietor. On the last point the court decided that the projecting roots and branches were a nuisance which the defendant might have abated; but had no right to appropriate to his own use.

From the New England Farmer.

TARRING FRUIT TREES INJURIOUS.

I would state a fact, showing, as I suppose the effect of *tar* upon fruit trees. My neighbor and I owned two adjoining orchards: the canker worms have visited them without mercy for eight successive years—my neighbor tarred his trees in the usual way, mine were many of them large, and taking into the account the expense and trouble and chance of injury from the tar itself—I suffered the insidious invaders to range unmolested. The last season the worms were few compared with preceding years, and many trees were permitted to produce as they were wont. My neighbor's trees abreast of mine, of the same age and kind, bore but sparingly, while mine produced in great abundance—the tar must have been the cause. This matter is, no doubt, well understood, but as it came under my own eye, I pass it to you: it may not be useful to publish.

Yours, truly,

JOSEPH HARRINGTON.

From Poeppig's Travels.

BREEDING OF CATTLE IN CHILI.

The breeding of cattle is, for two reasons, the branch of rural economy which is preferred by the Chilian to every other; in the first place it gratifies an inclination for wild and independent life, and his love of every thing that is adventurous and bold, and requires violent, not uniform, exertions. The best educated men of the larger towns, on an occasional visit to the country, take pleasure in pursuing the cattle, and participating in the occupation in which the mountain herdsman (vaquero) is engaged. * * * The Chilian, especially of the lower class, possesses a wild energy of character, which was misunderstood by the former government, or at least not duly employed, and which inclines him to such occupations as disqualify him and probably will do for a long time to come, for a uniform and sedentary employment. A second perhaps still more important reason is, that, since the expulsion of the Spaniards, and the introduction of a free system of trade, the breeding of cattle has proved more profitable than agriculture. * * * The number of animals which a single land owner possesses, would often appear extravagant to a European ear. They speak with great indifference of herds of 1000 or 1500, and consider a man by no means rich who has three times that number. The haciendas in the central provinces often have from 10,000 to 15,000, and many even 20,000, and the number of smaller estates which have from 4 to 5000 is very great. Since the revolution, the value of this species of property has risen in an extraordinary degree; and

the owners are very far from doing as they did in former times, killing the animal for the sake of his hide, and leaving the flesh to be devoured by the condors. * * * This branch of Chilian economy is however not without risks, which are not indeed frequent, but cause astonishing destruction. In the years 1829 to 1832, a vast number of cattle perished in consequence of an unexampled drought, which extended over all the provinces of Central and Northern Chili. It appears from an official statement, that in the year 1831 alone, 515,326 head of cattle died of hunger in the provinces of Coquimbo and Copiopo; of these about 77,000 were horned cattle, 10,000 horses, 23,000 sheep, 211,000 goats, &c. Though the number may be rather exaggerated, because the landowners wished to make their loss appear as considerable as possible, still the injury was very great.

From the New England Farmer.

RAISING CHICKENS.

MR. FESSENDEN,

Sir—In one of your late papers I saw mentioned a successful way of *raising chickens.* I have been in the habit of raising them for some years, and if you think favorably of the mode I have adopted, you can insert it in your valuable paper.

I keep my hens warm under cover during the winter, and feed them on "Brewers' Grains" placed in an open box or tub, that they may eat when they please ,occasionally giving them oats, corn, and oyster shells pounded fine, and plenty of water. By keeping them warm and well fed, they begin laying earlier in the season. I prefer spring chickens, as they lay earlier than old hens—and the old hens to set, as they make the best mothers. I take care the eggs do not get chilled with cold, and keep them in a warm place in my house. When three or four hens want to set, I put from thirteen to fifteen eggs under each of them, according to size—the day of the month marked on each egg—and after the hen has set a week or ten days I examine them by holding the eggs to a crack or knot hole in a board when the sun shines through, and if I discover any rotten ones, I take them away and replace them with fresh ones marked as before mentioned. When the chickens are all hatched, I put two or three of the broods to one hen, in a coop with an opening against an empty barrel placed on the bilge, and with a little care, when put in the coop, the hen may be made to brood them at the further end of the barrel. In that way the chickens that are not covered by the hen huddle together around her, and keep each other warm. The hens from which the chickens are taken I put into another coop, and in about a fortnight they will begin to lay again. The hen being confined in the coop, will leave her chickens much earlier than if left to run at large with them, and the chickens will become so accustomed to going into the barrel and huddling together, as to be quite contented to give up the hen's brooding them. After the chickens are two or three weeks old I remove them with the coops into my garden, where they feed upon insects, so as to require but little food—but do not keep them there until they are large enough to injure the garden.

I feel persuaded that in the way I have proceeded, our market could be supplied with an abundance of poultry, and I recommend it with confidence, if managed with care and attention, as profitable to those who may engage in such business.

Charlestown, July, 1836.

From the Advocate of Science.

PRACTICAL USES OF GEOLOGY.

So far from being that abstract and speculative science which those who are ignorant of it often suppose it to be, geology is full of useful application to the common pursuits of life. The agriculturist, the miner, the architect—every employment that has a direct relation to the materials of our globe, derives advantage from geological knowledge. It cannot be otherwise, when geology involves an acquaintance with all the substances which enter into the composition of the accessible portions of the earth.

But the most striking and the most beautiful application of this science to useful practical purposes, depends on the principles of stratification hereafter to be explained. For the present I will only remark, that the superficial portion of our planet is found to be stratified, or composed of distinct strata of various materials; and that these strata are proved to occupy a uniform position relative to each other.

Mineral salt occurs in one of these strata associated with gypsum or plaster of Paris. Where one of these valuable minerals is found, the presence of the other may therefore be suspected. But the stratum containing them is superior in its situation to crystallized limestone, to slate and to granite. It follows, that wherever the exposed surface of the earth consists of either of those rocks, gypsum and rock salt do not exist; and a search for them would therefore be fruitless. In searching for coal and other mineral productions, similar principles are called into application, and prove a valuable aid to the miner. For want of the knowledge of a few of these elementary principles of geology, much time and labor and money have been wasted in attempting to discover substances of value in situations where they could not exist.

Extracts from the Journal of the Franklin Institute.

LIST OF PATENTS ISSUED IN DECEMBER, 1835, FOR IMPROVEMENTS OF MACHINES, &c. TO BE USED IN AGRICULTURE.

With remarks, by the Editor of the Journal of the Franklin Institute

For a *Machine for Hulling Clover and other Seeds;* George W. Taylor, Bridgeton, Cumberland county, New Jersey, December 4.

The rubbing is to be effected by revolving, cast-iron disks, the surface of which are convex, so that they are in shape like a double convex lens; the surfaces having grooves formed upon them, and which revolve between cast iron cheeks furrowed in like manner, and embrace about two-thirds of the disks, the other third being cut away to allow of the necessary space for the feeding and delivery of the seed. There is to be a feeding hopper above

the revolving disks, and other necessary appendages. The claim is to the machine as described.

For a *Machine for Cutting Straw, and Thrashing and Winnowing Grain;* Leonard Marsh, Hartford, Windsor county, Vermont, December 9.

This is a combined machine intended, in general, to cut the straw into lengths, like an ordinary straw cutter, and to thrash the grain from it, after which the grain and straw are to be separated by winnowing, in the usual way. When the grain is to be thrashed only, the cutting knives are to be removed, the thrashing part remaining, to effect that object.

For an improvement in the *Machine for Pressing and delivering Bricks;* Ulysses Ward, Washington city, December 15.

This patent is obtained for an improvement upon the brick machine patented by Nathan Sawyer, on the 8th April, 1835, which it is proposed to simplify by dispensing with the combination of wheels for conveying the power to the press, and by certain alterations in the apparatus by which the pressed brick is delivered. These alterations, or improvements, could not be clearly described without the drawings; we are informed that the improvements, are really such, as they have been carried into operation, fairly tested and compared with the original machine.

For a *Machine for Cutting or Splitting Laths;* Barnabus Langton, Troy, New York, December 15.

A horizontal bench, or frame, is to be made, which may be sixteen feet long and seven wide; and at each end of this there is to be a head-block, against which the laths are to be cut. The cutting is to be made from the edges of boards, sawed of a proper length, there being two cutting knives at each end of the frame. These cutting knives meet in the middle of the board, as the lath is cut, their outer ends working on pins attached to the head-block or frame, and their inner ends on similar pins connected with a sliding bar extending along the middle, and from one end of the frame to the other. The sliding bar is worked backward and forward, horizontally, by a crank motion, so that when the knives at one end are cutting a lath, those at the other are being withdrawn to allow the board to descend for a new cut. The pieces of board are passed into a slot, edgewise, at either end of the frame, and descend by their own gravity, or to a gauge which determines the thickness of the lath. It is proposed sometimes to use a single knife at each end, which knife must in that case, be the whole length of the lath.

The claim made "in the above described machine, is the machine itself, and the manner of cutting lath above specified and described."

Such a claim, we apprehend, must be understood to include not only the combination, but also, the several parts as described; in which case it is much too broad, as the cutting of laths from the edges of boards, fed to the knife in a similar way, is not new. In some instances the knives used have formed a very obtuse angle in the middle, so as to cut first at the two ends, and this plan we think much preferable to the jointed knife which is at every instant altering its cutting angle. Still, should the machine before us be preferred, we think that enough of novelty might be pointed out upon which to found a valid claim.

For a *Tobacco Press;* John W. Weems, West River, Anne Arundel county, Maryland, December 15.

There is not the slightest novelty in this press, although such a one may not have been used for pressing tobacco. The piston, or driver, placed horizontally, is a rack into which a pinion works, this pinion being on the shaft of a cog wheel, turned by a pinion on the shaft of a drum, or hand wheel. The hogshead into which the tobacco is to be pressed is rolled on to the frame, or ground sills of the press, one end resting against a head block, and the follower being brought up against the tobacco contained in it.

The claim is to " the before described press, for pressing tobacco and other substances."

For a *Machine for Cleaning Buckwheat;* Daniel T. Laning, Bridgeton, Cumberland county New Jersey, December 15.

A stationary hollow cylinder is to be made and fixed on a suitable frame, its periphery being in part formed of boards, and in part of woven wire. An axis passing through the centre of this cylinder carries four wings made of plank, which are caused to revolve by means of a whirl placed on the end of the shaft, thereby agitating the buckwheat which is put into the cylinder, and throwing it against the woven wire, through the meshes of which the foreign matter escapes. The claim is to "the said machine."

For a *Thrashing Machine;* Moses Davenport, Philips, Somerset county, Maine, December 28.

The general mode of thrashing by a cylinder and concave, is employed in this machine, the concave being placed above the cylinder. The claims made are to a feeding roller with teeth, which takes the unthrashed grain from a feeding apron, and aids in conducting it to the cylinder, and to what is called a separater, which allows the grain to pass through to riddles and fans, whilst the straw is carried off. There is nothing in this machine that requires particular notice.

For a *Brick Machine;* Benjamin Hamblett, Portland, Cumberland county, Maine December 28.

The clay is to be mixed in a box by revolving arms or knives, in the manner well known, and from the lower end of this it is to pass out through an opening to be moulded and struck. The apparatus is described at great length, and there are several distinct claims; the machine so nearly resembles some of its predecessors that any attempt at description and comparison, would demand much room, and consume more time than we have to spare. The claims alone would not furnish a correct idea of the things claimed.

For a *Thrashing Machine;* Amos Hanson, Windham, Cumberland county, Maine December 30.

This is a machine of the most common construction, and the claim made is to " the pulleys, bands, and wooden wheels, and the manner of operating the same thereby," a claim about as good as any

that could be made where there is nothing upon which to found one.

For a *Mowing and Reaping Machine;* Alexander M. Wilson, Rhinebeck, Duchess county, New York, December 30.

This, like some other mowing machines, is to be driven forward by a horse, and it has on its front a horizontal revolving wheel which carries the cutters by which the mowing, &c. is to be effected. This wheel is caused to rise with the rise of the ground, by the action of small wheels or rollers, and is itself driven by means of a band around a drum on the axle of the large wheels. There are several appendages which it would be in vain to describe without the drawing. The claim is to the fly wheel with its knives or cutters, substantially as described, together with the general arrangement of the apparatus. Similar cutter wheels have been employed, and we do not see any thing in the general construction of this machine likely to insure its operating better than other mowing machines previously patented in this country and in Europe.

From Loudon's Gardener's Magazine.

REVIEW.

The Use of Crushed Bones as Manure.

By Cuthbert William Johnson, Author of "An Essay on the Employment of Salt in Agriculture," &c. Pamph. 8vo. pp. 16; third edition. London, 1836.

The use of bony matters as manures, originated in the neighborhood of Sheffield towards the conclusion of the eighteenth century; the farmers being allowed, at first, to carry away the bone rubbish for nothing; but afterwards, when it was found of some value, a small charge per load was demanded by the manufacturers, from whom the rubbish was obtained. The use of bones as manure did not become general till the Doncaster Agricultural Association published a circular letter of inquiry, about ten years ago, which directed the attention of the public to the subject.

Such is the essence of the historical introduction given by Mr. Johnson. He next examines—1. The composition of bones; 2. The component parts of bones found in vegetable substances; and 3. The effects of, and the modes of applying bones, either broken, crushed, or in the state of powder, or bone dust.

1. "The bones of animals do not vary much in composition: they all contain phosphate of lime, and carbonate of lime, with a portion of cartilage or animal matter, with other minor ingredients." (p. 5.)

2. The cartilage of bones is composed of a substance nearly identical in all its properties with solid albumen.

"One hundred parts of albumen are composed of

	Parts.		Parts.
Carbon, - -	52.888	Azote, - -	15.705
Oxygen, - -	23.872		
Hydrogen, -	7.540		100.

It is perfectly needless to specify any vegetable substances into which the three first of these enter; for the vegetable world is almost entirely composed of them, and occasionally, though rarely, a portion of azote is also found in vegetable substances, but the three first are invariably present. The flour of wheat, the poison of the deadly nightshade, the oxalic acid of the wild sorrel, the narcotic milk of the lettuce, the stinking odor of the garlic, and the perfume of the violet, are, by the contrivance of their Divine Architect, only some of the results of the combination in different proportions of carbon, oxygen, and hydrogen.

But the chief constituent present in all bones, we have already seen, is the phosphate of lime; and how absolutely necessary this substance is for the healthy vegetation of plants, will be apparent from the following table, which contains the results of the examination by MM. Saussure and Vauquelin, and a few other distinguished chemists, of the ashes, or solid contents, of a number of vegetable substances.

One hundred parts of the ashes of the

	Parts.		Parts.
Grain of the oat yielded of phosphate of lime, - -	39.3	Seeds of barley, -	42.5
Straw of wheat, phosphates of lime and magnesia, -	6.2	Seeds of oat, -	24.
Seeds of wheat, -	44.5	Leaves of oak, -	24.
Bran of wheat, -	46.5	Wood of oak, -	4.5
Seeds of vetches, -	27.92	Bark of oak, -	4.5
Seeds of golden rod (Solidàgo Virgaùrea,) - - -	11.	Leaves of poplar, -	13.
Plants of turnsole (Helianthus ánnuus,) - - -	22.5	Wood of ditto, -	16.75
Chaff of barley, -	7.75	Leaves of hazel, -	23.3
		Wood of hazel, -	35.
		Bark of hazel, -	5.5
		Wood of mulberry,	2.25
		Bark of mulberry,	8.5
		Wood of hornbeam,	23.
		Bark of hornbeam,	4.6
		Seeds of peas,	17.5
		Bulbs of garlic,	8.9

Phosphate of lime has also been found in the common bean (*Vicia Fàba,*) and in the pea pod, or husk, by Einhof; in rice, by Braconnot; in the Scotch fir, by Dr. John; in the quinquina of St. Domingo, by Fourcroy; in the fuci, by Gaultier de Clauberry; and in many others. In fact, as Dr. Thomson remarks, *System of Chemistry*, vol. iv. p. 319., "phosphate of lime is a constant ingredient in plants."

The cultivator of the soil will not be incredulous as to the power of vegetables to dissolve and feed upon the hard substance of the crushed bones of animals, when he is reminded that the ashes of the straw of wheat are composed of 61½ per cent of silica (flint,) a still harder substance than the hardest bone. And this is not a solitary instance; for the same earth abounds in a still greater proportion in the straw of other grain. Vauquelin found 60⅝ per cent of it in the ashes of the seeds of the oat; and the Dutch rush (*Equisètum hyemàle*) contains it in such abundance, that it is employed by the turner to polish wood, and even brass." (See *Mag. Nat. Hist.*, vol. v. p. 178.)

3. The returns received by the Doncaster Association, established the efficacy of bones as manure, more especially on light soils; and Mr. Johnson's pamphlet concludes with the following general directions for their use:—

"The crushed bones have been invariably found more immediately beneficial as a fertiliser, when suffered to remain previously for some weeks, mixed with earth in heaps, exposed to the action of the atmosphere. By being thus fermented and dissolved, they are necessarily more speedily serviceable as food to the plants to which they are applied; and this observation more especially relates to the oat, barley, and other spring corn, since these do not remain on the ground for so long a period as other agricultural crops. The proportion is 50 bushels of bones, with five loads of earth or clay; or 40 bushels to five loads of common dung.

For wheat, and pasture lands, the previous fermentation of the bones is, for this reason, not so essential to the production of immediate benefit.

It is impossible to give any general directions for

the quantity of bones to be applied per acre, since soil, situation, and climate, must all be taken into the farmer's consideration.

The following facts, however, have been ascertained by numerous experiments, at some of which I have personally assisted:—

1st. That crushed bones remain in the soil for a length of time proportionate to the size of the pieces; the dust producing the most immediate effect, the larger pieces continuing to show the longest advantage. On arable land their good effects continue for four years; on pasture land for eight.

2ndly. On turnips, oats, barley, and wheat, the quantity applied has been from 25 to 30 bushels per acre; on pasture land, from 25 to 40 bushels of bone *dust*, early in the spring.

3rdly. The best mode of application is by the drill, with the seed corn.

4thly. The bones should, when first used, be always applied, for the sake of correct information, in varying quantities per acre; and on no account should the farmer omit to leave, by way of comparison, a fair portion of the field without any manure."

Mr. Johnson deserves the thanks of the public for having produced this useful pamphlet. We wish we could impress upon gardeners the value of bones as a manure; because there is not a gentleman's gardener in Britain who cannot command a certain quantity of them, which are at present lost for every useful purpose. The bones could be deposited in the back sheds, and broken by the men during wet or inclement weather; and afterwards fermented in the compost ground with common garden earth. In the composition of vine borders, powdered bones, which have been fermented, form a most valuable ingredient.

From the New York Farmer.

AGRICULTURE IN RHODE ISLAND.

A short visit to Newport and Bristol, in Rhode Island, has given me a favorable impression of their husbandry; in some cases, I am half disposed to call it, gardening. Rhode Island, properly so called, on which Newport is situated, lies on the eastern shore of the State to which it gives it name, and stretches from south east to north west a distance of about fourteen miles, and with an average width of three miles. It is surrounded by deep water; and has in general a bold rocky shore with very little salt marsh, and as well as I could judge no swampy ground in the interior. It lays in the bay like a large whale reposing on the surface of the sea, without any great elevation, but gradually rising on its eastern and western sides longitudinally to an agreeable and beautiful height in the centre. It is almost entirely destitute of any other than ornamental trees; but there are a good many of these, though we regretted among these to see that the common button wood predominated, as it is almost as great an impoverisher of the soil as the Lombardy poplar. The moisture of the climate gives to the landscape that bright and beautiful green, which is said to characterize the British Islands, and which the Emperor Napoleon so much admired. The island seems based upon a rock, a kind of slaty granite; and the water, which is easily obtained, is of an excellent quality. In the north-western part of the island, anthracite coal abounds; but the coal is not of so good a kind as to encourage further operations, and the mine, at least for the present, is abandoned. In general the soil is a deep dark loam, in the southern parts more mixed with sand than in the northern, comparatively free from stone; and although it produces good crops of Indian corn, yet it seems more favorable to grass, oats, and potatoes. The fences are in general of stone, high and well built; the fields, a rare thing in New England, dividing generally into rectangular lots; and in the southern parts of the island, are fertile, richly manured, and under high cultivation. The farmers are most of them the independent possessors of the soil which they cultivate; and the houses and buildings generally in the country are remarkably neat; some in the neighborhood of the town are tasteful and elegant. Without the town I do not recollect a single house that was in a state of dilapidation or that looked like the abodes of intemperance and vagabondage. We may reasonably infer that, there being among the inhabitants a large proportion of Quakers, who are ordinarily models of neatness and good domestic management, has had in these respects a favorable influence. The climate, to those who like the proximity of the sea, is delightful in the warm months; it is milder in winter, and it is much cooler in summer than places more inland.

The stock kept upon the island are principally sheep; and these chiefly of what are called the old fashioned merino, with very little mixture of Saxony; the average yield of fleece from three to four pounds; and bringing in the market from fifty to sixty cents per pound. On land averaging in value one hundred dollars per acre, and with hay at fifteen to twenty five dollars per ton, though the price in years past has been about ten dollars per ton, sheep husbandry would seem hardly to be profitable, though they say that "sheep pay better than any other stock;" as indeed well it may, as who would think in such circumstances of raising neat cattle to advantage, when the value of a yearling would not be so much as that of a calf six week sold? They are wise in desiring to consume all their hay upon the place, for although the farms on the sea shore are favorably situated for procuring sea manure, yet in the interior they require all the manure they can make on their farms. I got information of no considerable dairy farms. Many swine are fatted on the island; and a very large amount of poultry, especially geese and turkeys, raised. For there a ready market is always to be found; but with what profit they are raised is another matter. As long as the geese are fed in the highways, the expense is nothing; but whoever undertakes to fat either geese or turkeys at the corn crib, or, as some permit them, to feed themselves among the standing corn, we advise to count the cost.

We saw extensive fields of oats, which appeared highly promising; and some most luxuriant fields of barley already suffering from their own weight. The crops of barley have for several years been cut off by an insect, whose depredations are similar to those of the wheat worm, and for which no remedy has yet been discovered. The crops of corn sometimes give fifty and sixty bushels to the acre, but the average yield is about thirty. The grass, principally herdsgrass and red top, which is a favorite grass in Rhode Island, with very little of clover, under the best cultivation, will yield two and a half tons to the acre; though this would be a very high average. As far as my

own observation goes, the red-top, though a most excellent hay for every kind of stock, never yields a great weight of hay to the acre. The average crop of potatoes is about two hundred bushels to the acre. Rhode Island heretofore has been remarkable for the quality of its potatoes. A kind called the Elam potatoe, a long, white, kidney potatoe, taking its name from a gentleman who first cultivated it here, was a long time celebrated; but has given place to the pink-eye and the Chenango. A very great crop here, and one more cultivated at Bristol, is the onion. The cultivation is said somewhat to have declined on this island; the crops for some cause not having yielded so well as formerly; but at Bristol, about fifteen miles above Newport, it is pursued very extensively and successfully. The produce of the onion crop last year in Bristol, I have been credibly informed, exceeded thirty thousand dollars. The red onion is that which is principally cultivated, being the greatest favorite in the West India market. The cultivation of the crop is simple and well understood. A good crop will give from four to five hundred bushels. The cost of cultivation very much exceeds that of corn; some give it as their opinion three times as much labor is demanded on an acre of onions as on an acre of corn. They are subject to few casualties, provided the seed is good; and the seed is never safe, if more than one year old. It is a singular feature in the habits of this plant that it bears planting year after year, without any diminution of the crop, on the same ground. I saw one field of two or three acres on which onions had been grown every year for more than forty years, and with equal success. The land pays for manuring well; though they are not particular as to the kind of manure applied, prefering however a rich compost to green manure. The large sized onions are put in barrels; the smaller sized are strung in bunches; the weight of the bunches being about three and a half pounds. The land is marked out in rows about one foot wide with a machine resembling a boy's sled with four runners, making three rows at a time, one runner being kept in the fourth track of the last marking. The seed is then dropped and covered very slightly by hand, in hills about six inches distant in the row; and four plants are generally left standing in each hill. The great business afterwards is to hoe them, and keep them free froom weeds. Two kinds are cultivated; an early and late kind. The former are usually ripe in August, and sent to market as soon as may be after ripening. The crop is, upon the whole, of easy and profitable cultivation. I was at the house of one farmer on the island who keeps about one hundred sheep, and who the last winter applied his onions, which were too small for the market, to the feeding of sheep; and he adds, with advantage to the sheep; a use of onions, I venture to say, altogether novel. The advantages of obtaining sea manure both at Newport and Bristol are very great; but particularly at the former place. Vast quantities are constantly driven upon the shore by winds and tides; and much is gathered in boats from the rocks. It is used in compost and as top-dressing. The eel grass is seldom used, but in compost; and principally as litter for swine; the rock weed has great effect, when applied as top dressing on grass ground. Common beach sand is likewise used as top dressing, and in compost, with advantage. I have myself tried it in moist cold soil, in the hill of potatoes, with success. But one of their principal manures is the "Manhayden" fish; a small fish, in appearance, resembling the herring or alewife. These are taken in great quantities, in large seines; and are sold at the rate of fourteen cents per barrel for manure. They are most frequently spread broad-cast among the growing corn, and left undisturbed upon the surface; or they are carried into the barn yard and mixed in compost. Their effects in either case are said to be very powerful. The odor of them, while rotting in the field, is most certainly powerful.

It is obvious that I could give but a cursory view of the agriculture of these places. But I can say with propriety that their agriculture, though admitting many obvious improvements, is highly respectable; and the island, from its remarkable salubrity, the fertility of the soil, and the beauty and many advantages of its situation, seems destined to become a favorite place of residence for industrious and enterprising cultivators and improvers of the soil, and of luxurious resort to the fashionable and wealthy. The island contains an inexhaustible supply of excellent building stone; of which two large cotton factories, propelled by steam, have already been erected, and others are in embryo. The population of Newport, at present, is about eight thousand; there is every encouraging prospect of its large increase. The projected and indeed half finished rail road between Providence and Stonington, in Connecticut, seems likely to divert the travel between Boston and New York in that direction.

H. C.

July, 1836.

REPORT ON THE NAVIGATION OF THE UPPER ROANOKE, BY MEANS OF STEAMBOATS OF SHALLOW DRAUGHT.

Communicated for publication in the Farmers' Register.

Lawrenceville, June 20th, 1636.

To Col. Andrew Joyner, Superintendent of the Roanoke Navigation Company.

SIR—Agreeably to the order of the Board of Directors, made at their meeting in April last, I set out, on the 12th day of last month, to perform the duties assigned me. The people of Clarkesville, most promptly and liberally responded to this effort of ours, by appointing Tucker Carrington, Esq., to accompany me, from whom I received much assistance.

From the Hon. Walter Coles, and the Hon. B. W. Leigh, we obtained every assistance they could give us in our investigations, by procuring and giving us letters to all persons in our route most capable of aiding us in obtaining the information we were seeking. These letters enabled us to make the acquaintance of many persons in the city of New York, and the States of Connecticut and Massachusetts, best acquainted with the subject of steam navigation in shoal water. In T. B. Wakeman, Esq., of the American Institute of N. York, Alfred Smith, Esq., of Hartford, Con., and Charles Stearns, Esq., of Springfield, Mass., I found gentlemen well acquainted with the subject, and who were not only willing, but did put themselves to much trouble and inconvenience to

oblige and assist us in every thing we desired. And although we applied to no one who did not manifest the greatest willingness to assist us, yet I should be doing injustice to myself and to one of the most valuable and worthy men in New England, did I not in a most especial manner acknowledge the great kindness and service rendered us by Alfred Smith Esq. Mr. S. like all his countrymen, is engaged in business, to which he devotes himself with great assiduity; and his worth being duly appreciated by his fellow townsmen, much of the public business is thrown on his hands. Notwithstanding all this—and although at the time of our visit to Hartford, he was superintending the erection of a large public building—he gave us many hours of his time every day, during our sojourn in that city. He had been superintendent of all the improvements on the Connecticut River, and knew all the facts in relation to them. He gave me a duplicate of the profile of the canals and locks around the falls; and a survey of the river, made under his direction; which I will send you for the use of the Roanoke Company, by the first opportunity.

Every person to whom we mentioned the object of our visit to the north and east, invariably directed us to Thomas Blanchard, as the man to be consulted and employed by us. Indeed the unanimity with which all recommended Mr. Blanchard, was astonishing—but when we went to Hartford and Springfield, and saw the steamer Massachusetts, ascending the Enfield falls, and what he had done in the United States' Armory at Springfield, we too, had no doubt of Mr. B.'s ability to put steam-boats on the Roanoke, if mortal man could.

This extraordinary man was a common artisan in the United States' Armory at Springfield, and I was told by Col. Robb, the superintendent, that he had added improvement to improvement in the machinery there, until it would seem to be as perfect as the art and wit of man could make it—the principal of which, however, is the machine for *turning* gun stocks, and any irregular figure. But the improvement for which, perhaps, his country will be most indebted to him, is his steam-boat for shoal water—it might be more appropriate to call it an invention—for it is built on a new principle. This gentleman I lost no time in engaging for our service; provided you should sanction it. By promptly adding your request to mine, you will soon have an opportunity of learning from Mr. B. himself, what he has done, and what he can do on our river.

I shall now proceed to mention such facts as I have collected, and I shall also venture to give you some conclusions I have drawn from those facts. Being, however, entirely ignorant of engineering (never having had my attention directed to such pursuits,) my conclusions must be received with great allowance.

The better to appreciate and apply the facts to be detailed, some account of the Roanoke, Dan and Staunton Rivers, will be necessary. The facts here stated of those rivers, are extracted from the surveys &c. of Messrs. Moore, reported after the death of the principal engineer, by Mr. Isaac Briggs, to the Board of Public Works. The distance from Rock Landing to Clarkesville, is 60 miles—from Clarkesville to the highest point of the the survey up Dan, is 125 miles—and from Clarkesville to the highest point of the survey up Staunton, is 109 miles. The whole fall from Rock Landing to Clarkesville, is 156.60 feet—average fall, per mile, 2.61 feet. Whole fall from Clarkesville of the 125 miles surveyed of the Dan River, is 277.47 feet—average fall per mile, 2.221 feet—whole fall of Staunton, from Clarkesville in the 109 miles surveyed, is 322.61 feet—average fall per mile, 2.96 feet. It will, from this, be seen, that the navigation of the Staunton is the most difficult—and that of the Dan the best of the three rivers.

In one material thing these surveys are very deficient; namely, the fall throughout each mile; for although a fall of ten feet to the mile, might be easily overcome, if equally distributed the whole distance, yet, as is frequently the case, if the whole fall, or a large portion of it, occurs at one or two places in the mile, it might defy all the power of man or steam. In other instances too, the survey only gives the fall for two, three, four and five miles; and frequently from place to place, so that the distance cannot be accurately known. This occurs most frequently on the Dan and Staunton rivers; on the Roanoke, the fall in the mile is generally stated. The falls in the Roanoke, which require to be here noticed, are Eaton's, fall in the mile 11.1 feet—Hamlin's Shoals, fall in two miles 16.11 feet. The next mile above these two, (having no name to designate it,) fall, 5.98 feet. Pugh's falls, fall in the mile 5.62 feet. Horse-ford fall in two miles 8.95 feet—and Butcher's Creek, being two miles long, fall in one mile 5.60, and in the other 5.50 feet. On the Dan the only ones I shall notice, are those of Hyco—they being the only obstruction for some 50 or 60 miles above Clarkesville. These falls are about 1¾ miles long, fall 12.89 feet. On the Staunton, Fally's falls are the only obstacle to Brookneal—and it is useless to notice any other on that river. Here, the survey is too inaccurate to enable me to ascertain the distance to which is affixed the fall mentioned; but as well as I can understand it, the rapids must be about 1¾ miles—in which distance, the whole fall is 15.23 feet.

I will now beg leave to conduct you to the Connecticut River, and lay before you some minute statistics. From Hartford (below which, the river is free from any obstruction) to the foot of Enfield falls is 12 miles—fall, not more than two or three inches to the mile, and the water smooth. Enfield falls are nearly 5 miles from head to foot; with one mile of slack water between the upper and lower falls. The lower falls extend nearly 2½ miles (half a mile of which is slack water) and has 20 feet descent—principally, if not entirely, confined to two miles: within these two miles, there are a succession of rapids—one or two of them greater than the others. After the termination of the lower falls, one mile of slack water intervenes; after which, we come to the upper falls, being one mile in length, and having a descent of 10 feet—the descent is unequally distributed, being most of it in three bars, namely—at Enfield bridge—Mad Tom Bar—and Surf Bar. From the head of the falls to Springfield, is 8 or 9 miles—and from thence to the foot of Headly falls, is about 8 miles farther; making the distance of 16 or 17 miles, from one fall to the other—in all which distance there is slack water, and fall of only a few inches to the mile. One mile below Hadley falls, how-

ever, you have Williamansett falls, being not quite such hard water as upper Enfield falls. Hadley falls have a descent of 50 feet in 2½ miles, around which there are locks and a canal through which, all boats and rafts are obliged to pass. From the head of Handley falls to Miller's falls is 35 miles—with sand and gravel bars—having by actual admeasurement, only between 8 and 9 feet fall in the whole distance. Above Miller's falls there is more rapid water, where steam boats have been tried without much success—owing, it would seem, more to the want of employment, than to their inability to navigate the river.

But to return to Enfield falls (where we have actual experiments and well attested facts for our guide)—several boats were put on the river and abandoned, before they got one to succeed. There are now two passage boats, and I believe two tow boats. The passage boats, are the Vermont and Massachusetts—the former, intended to run in low water, is 75 feet long—including wheel, 13 feet wide—draws 19 inches. The Massachusetts is 97½ feet long, including wheel (which is in her stern) 13½ feet wide—draws 22 inches of water when laden, and has two engines of 17½ horse power, each. Aboard of this boat I passed over Enfield falls, three times. She can carry 75 passengers, has no accommodations for night or meals—but comfortable cabins for both ladies and gentlemen. In ascending the lower rapid 2½ miles, she cleared them handsomely and with ease, in 42 minutes; and she went up the upper falls (being exactly one mile) in 23 minutes by my watch. Descending, little or no steam is used—ascending, the boat is quite obedient to the helm; but when the current is extra strong, poles are used to keep her steady—descending she is also steered by a tow oar. She makes a daily trip from Hartford to Springfield, 26 miles, and back—going up in 5 hours, and returning in 2½ hours—has run with regularity and entire success, for four years; and is considered as good property, as any in New England. She, as well as the Vermont, was built by Thomas Blanchard. Her crew consists of 5 hands, including captain and pilot—her expenses are about $100 a month; and cost about $6000; but owing to the advance in labor and materials, it is probably that such a boat, would now cost more.

Around Enfield falls as well as the other falls on the river, there are locks and a canal, through which the freight and tow boats pass—though the tow boats have gone up Enfield falls, it is found to be best to go through the canal. These two boats can carry 150 tons, at the rate of 2½ miles an hour—against the current of 1½ miles an hour; but experience proves, that towing less than that, is much better. The William Hall, one of the tow boats, has ascended a rapid of 9 feet in the mile, towing up 20 tons—her engine is 20 horse power, and she cost between four and five thousand dollars. At Hadley falls, after the freight boats get through the canal, they are taken in tow by another tow boat, at the head of the falls, and carried up to Miller's falls.

Before steam boats were used on this river, above the falls, the trade was carried on by means of freight boats of 25 tons, with a sail, to be used when the wind was fair. When these boats ascended Enfield falls, they took in additional hands, so as to have one hand to the ton, when they were propelled by poles; and I was told that it was as hard labor as men could endure: it frequently consumed the whole day to get one of them over the falls, 5½ miles. Here, steam *has* succeeded, both as applied to passage and tow boats—and it could seem from this, that where a man can push a ton up a current, by means of a pole, steam can be employed with success, profit and regularity.

The Connecticut, upon an average, can only be used for navigation seven months in the year—it is ice-bound for three months and a half, (last year much longer,) and the water is too low for one and a half months in the summer. I saw Mr. Goddard in Hartford, who is the proprietor of the steamboats on the Altamaha, Ockmulgee, and Ockonee rivers, who informed me that they were entirely successful. I was also informed by Mr. D. Copeland, of Hartford, that he had succeeded in putting a steam-boat on the St. Lawrence, where the fall was much greater than at Enfield: but I was unable to get the particulars in consequence of Mr. Copeland's being obliged to leave Hartford for N. York, unexpectedly. Mr. C. is an engine maker of high reputation, and a man of high standing. Mr. Blanchard has also succeeded, (though not to the same extent that he has on the Connecticut,) in putting steam-boats on the Kennebeck, Genesee, and Susquehanna rivers: in the latter, he informed me that he had ascended some half a dozen mill dams. This boat, however, did not run long, and she has not been repaired, or replaced by another.

Here, perhaps, with strict propriety, my communication should close; but some opinions must necessarily have grown out of what I have seen and heard—and I hope I shall be pardoned for expressing a few of them. This, however, considering the position of things, may do little else than draw forth a denial of the facts stated, and unfriendly criticisms on the conclusions and reasons which I shall give. The improvements made by the Roanoke Company, have brought into existence so many rival schemes for monopolizing the trade of the upper country, that almost any opinion which may be expressed, will be *charitably* ascribed to a wish, to promote one, or put down another. I have what to me is a considerable interest in the Roanoke Company; and I am entirely unconnected with any other of the various and conflicting interests on, or pertaining to the river. I have looked at this subject exclusively as a stock-holder of the Company—and every thing I have done, and what I shall say, will have no other end in view, but the advancement of its interest.

The most important conclusion I have come to, is, that steam-boats can be put on the Roanoke and its two principal tributaries, with profit and success—whether they will be able to navigate the *whole* of the Roanoke, Dan and Staunton, remains to be tested by actual experiments; but that they can be successfully and profitably employed on a large part of all three rivers, and that too, without the Company's incurring much expense in further improvements of the beds of the rivers, I have as little doubt as I can have of any thing not yet demonstrated. The facts above stated, I think, abundantly warrant this conclusion. There is but one fall on the Roanoke greater than that of Enfield; there is not one on Dan or Staunton, for a considerable distance up both streams so great. Why, then, (it may be asked,) may we not ascend our rapids as well as they do those on the Connecticut?

From the head of Pugh's falls, almost to Danville, there is no rapid equal to the falls of Enfield by several feet to the mile—there are but three which can be considered as opposing any real difficulty—namely, the Horseford, Butcher's creek, and the Hyco falls. The Horseford has 8.95 feet fall in two miles, Butcher's creek has a fall of 5.62 feet in one mile, and 5.59 feet in the other, and Hyco has 12.89 feet fall, in one mile and three-quarters. The only fall on the Staunton below Brookneal, of any magnitude, is Tally's falls, where the descent, in one mile and three-quarters, is 15.23 feet—making in all, only four places to be overcome, to render the rivers accessible to steam-boats for largely upwards of one hundred miles, on the Roanoke and Dan, and about fifty miles on the Staunton. If nothing else could be done but to rescue these portions of the rivers from the state of comparative uselessness in which they at present are, would it be nothing? It appears to me that these improvements, (if indeed any are required to be made,) can be done by the company in a short time, and with but little expense. I am sensible that the Board of Directors, at their last meeting, directed that the work should be commenced at Rock Landing; but I think the policy of beginning at the head of Pugh's falls, and bestowing the first labor on the Horseford, Butcher's Creek falls, Hyco falls, and Tally's falls, is so obvious, that you ought to do, what I am sure the Board would do, had they now to decide the question again. Our policy is, certainly, to apply our labor so as to open as much of the river as we can, in the shortest time, and with the least expense: in what other way can it be done?

Let us consider for a moment, that these four obstacles are removed, and steam-boats can navigate the rivers as above supposed; there would be an immediate, easy, and expeditious communication between Danville and the Gaston rail-way, by running stages a short distance down the river, from Danville to the boat; and from the head of Pugh's falls (about 7 miles) to Gaston. And there would be nothing to prevent another boat's running from Brookneal to the same place. I do not think it improbable, in such a state of things, that a toll of one dollar for each passenger, would give the company more revenue, than all the other tolls put together.

As to the falls between the head of Pugh's falls and Rock Landing, and those high up on the Dan and Staunton, they would be attended to, after these four places should be put in order. I think it not improbable that the 12 miles below Pugh's falls, will require more labor and expense than all the others: if so, the river being improved above, would give us ample revenue to work on, and remove these obstructions.

But suppose we find some place on the river which steam-boats cannot ascend? If steam cannot overcome it, machinery may; and to view it in its worst aspect, should we be obliged to change boats, and have passengers and baggage carried around such a place, still we shall have accomplished much.

All these remarks apply to passage boats: they are found to be capable of ascending worse rapids than tow boats. The latter, however, would soon follow the introduction of the former; and I have little doubt they can be turned to good account.

May I not hope, in conclusion, that this subject will engage the attention, draw out the energy, and stimulate the enterprise of the enlightened and patriotic sons of those lovely and fertile valleys? Ardently hoping it may,

I remain, dear sir,
Your obedient servant,
E. B. HICKS.

For the Farmers' Register.

WHAT IS THE BEST ROUTE, THROUGH CENTRAL VIRGINIA, FOR A RAILWAY TO THE SOUTH-WEST?

Among the great works for facilitating transportation, yet to be commenced in Virginia, no one is more wanting, or will be found, when completed, more important, than a railway to connect James River and the north and south line of railways, with south-western Virginia—and ultimately with Tennessee and the great railways which will connect Nashville with New Orleans, and Charleston with Cincinnati. The vast importance, to Virginia, of this particular improvement, is strongly impressed on the mind of every man of observation and judgment who has given attention to the subject; and the discussion of its minor features, has recently excited warm partizan feelings, and the array of opposing interests of the towns and other corporations that hope to have the general scheme made to bend to suit their different purposes, and to serve their particular interests. As is usually and unfortunately the case, the scheme of a railway in connexion with the south-west has not been viewed, by the advocates who have entered most warmly into the discussion, so much in relation to its benefit to the producing back-country, and to the state at large, as in relation to its bearing on the separate interests of the several towns, through or near which the route may be made to pass. Now, as the general good is made up of the amount of benefits derived by the several parts of a country, it is an important public and general gain, as well as particular and private, that either Richmond, Lynchburg, Petersburg, Farmville, Danville, or Abingdon, should derive increase of trade and wealth from such a public work. But I protest, in the outset of my remarks, against the interest of either of these, or any other towns, being considered of importance at all comparable to that of the producing back-country, and still less, to the general interest to be promoted by the construction of this great work. To build up all our growing towns and suitable places for trade, is highly important to the interest of the several producing regions; and more especially is it important to all Virginia, that Richmond, her metropolis, and principal commercial town, should be benefited as much as circumstances will permit, without a sacrifice of general interest to that end. Still, it is proper that all should consider this great work *in our character of Virginians*, and not merely as inhabitants or property-holders of one or other of these several towns, or of the particular region of country of which any such town may be the market. What is wanting, is the cheapest and most perfectly available means for transportation between the tide water of James River and the south-west part of Virginia—and the more towns, or places for trade, that this route can pass through or near, or can give benefit to, without damage to

the great object, so much the better for the commonwealth, as well as for those particular places. So far I fully and readily yield to the claims of private and separate interests—and not a jot farther. The scheme which I shall advocate, comes in conflict with some of the private interests, or the *more dearly cherished commercial prejudices*, of every town east of the Blue Ridge, that will be affected by the improvement: and therefore, though a heavy balance of advantages may still be offered to all of them, it is probable that my views will not be acceptable to any one.

There have been two routes proposed for the eastern part of this railway, (from Richmond to Lynchburg,) and each has been advocated by friends, and opposed by foes, with that warmth of zeal which is kindled by self-interest. These are, 1. Along the valley of James River, and of course along side of the great canal now in the course of construction. 2. Along the ridge of highland which separates the waters of the Appomattox from those of James River.

The capital objection to both these plans, is, that a railway so near to James River, as either of these, would be a dangerous rival to the canal, in which the state has so great a pecuniary interest, and in the success of which, Virginia at large, and Richmond in particular, have interests much greater than merely the money invested, or hereafter to be invested in that great work. This objection is so manifest to the valley route, that we may safely assume the position that the power obtained from the legislature by the James River Company, to construct the valley railway, was asked for, not to *effect*, but to *prevent* the construction—to obtain possession of, and to keep inert and harmless, a power that would be most fatal if wielded by hostile hands. The only present effect of the existing charter to construct the valley railway, is to array another vested right in opposition to a charter for a railway on the ridge route—to which latter route is also opposed, but with less force, the objection that it would take away the business and profits, and thereby hazard the very existence of the canal now constructing. How far this objection to the ridge route is justly charged, I cannot pretend to say, or even to hazard a supposition: but to that extent, the objection ought to be allowed its full weight and force, by the Richmond interest, by the Legislature, and by the people of Virginia.

Cannot these objections be respected, and these opposing interests be reconciled—and yet be obtained, by another route, the great benefits of the south-western trade and travel, increased, as both would be, by such facilities? Such a route, free from all important objections, promising new benefits to all interests, and injury to none, I conceive is presented on the ridge which separates the waters of James River, from those flowing into Albemarle Sound. This route, (which has been recently proposed in the newspapers,) in connexion with the Richmond and Petersburg railway, would still make Richmond the termination, and doubtless the principal receiver and outlet of this long line of trade and travel: and such being the case, Richmond ought not to object to a feature that would surely be beneficial to the country furnishing the supplies of commodities and of travellers, viz: that the route would pass through another town, Petersburg, and thereby would permit, whenever desirable, a different destination to travellers, or to the products of the country. If this road, on the whole, was more profitable to the stockholders, and was not more expensive of time or money to their customers, surely it would be highly advantageous that there should be two or more markets offered, instead of one only.

But it will be at once objected to this southern route that it is much longer, and therefore, that a railway thereon would be much more expensive, both to construct and to use, than on the ridge north of the Appomatox. If so, then it certainly ought not to be adopted, unless, indeed, there should be other sources of additional profit to the stockholders, and of advantage to the public, more than equal to any possible increase of cost on the former route. Such advantages and disadvantages cannot be estimated and compared, with even an approximation to truth, until after a correct survey of both routes. But with the present imperfect light on the topographical features of the country, it may be well doubted whether Richmond would not be reached as quickly, easily, and cheaply, from Abingdon, or from New London, by passing through Petersburg, as on the ridge north of the Appomattox. I ask attention to my reasons from those who may be ready to pronounce this opinion as not only incorrect, but absurd and ridiculous.

Let us first consider the comparative facilities offered by both routes for railway construction, and for the after transportation on both.

The route between the James and Appomattox being on the ridge which separates the tributaries of the two rivers, may be supposed to be not very far from level. But to keep on that ridge, the route must have many curves—and it would be generally within a few miles distance of good navigation, either on Appomattox, James, or Willis' river—all being in the same direction, and having the same eastern termination, with the railway. It follows, necessarily, that a region of country to which three navigable rivers, and hereafter the canal, will be so accessible, will furnish scarcely any country produce to the railway, and will as little require its aid to bring back foreign commodities. This is, indeed, fully admitted by the advocates of that route, who make use of that admission as ground to maintain that such a road could not take away business from, and therefore would not affect the success of the James River canal. When the improvements of the James and Appomattox, (both now in progress,) shall have been completed, no counties in central Virginia will be so well supplied with facilities for transportation to market, as Chesterfield, Powhatan, Cumberland, Buckingham, and Prince Edward, through which this railway is to pass—and therefore, to aid the transportation of commodities, the railway is not wanted, and would be in that respect of no value.

The ridge south of the Appomattox is remarkable for its long-continued level, and not far from direct course, as far west as New London. Between that place and Petersburg, if the traveller will keep on the dividing ridge, he will not cross a single stream, a ravine, or a hill. Such is the report of the remarkable features of this line by those who know it best. Such level ridges are not rare in middle, and are still more frequent in lower Virginia: but it is seldom that one so long, or so direct, as this is found in a similar region. The same

course continued would still be on a very level route, by Liberty to Buford's Gap through the Blue Ridge, directly as can be, and on the best possible route to Evansham and Abingdon. All the route, however, west from New London, would be common to both of the eastern routes proposed.

It is not to be supposed that a railway could be kept on the summit of a ridge, even if the location offered a perfect level. The interlocking of the head springs of the streams flowing to opposite sides, would often affect the straightness of the ridge. But these streams, so near their sources, would not be much below the general level, and would not be expensive to be crossed by nearly level construction. Allowing for such straightenings in various parts of the line presented by the middle of the ridge, the line would pass from Petersburg, or (to be more precise,) from the Petersburg & Roanoke Railway, a few miles south of Petersburg, through Dinwiddie, by Nottoway Court House, and nearly along the line which separates Lunenburg and Charlotte on the south, from Prince Edward on the north: and this route is every where so distant from any existing or contemplated improvement for transportation, that the railway would convey all the marketable produce of the adjacent country, and yet take away no business or profit from any other road or navigation. At New London, or before, the two ridge routes would unite: and therefore the western construction of the railway would be the same for either plan.

Next, as to the comparative length of the two routes for railways. According to Wood's and Boye's large map, the *straight* lines from Richmond to Lynchburg, and from Petersburg to Lynchburg, are very nearly equal—the latter being 1½ miles the longest; and the straight lines from the same towns to New London, are precisely equal. But even if the map does justice to the more southern lines, (which there is good ground to doubt,) the comparison of the practicable road routes would be still more favorable to Petersburg. The actual road distance from Richmond to Lynchburg, (by mail computation,) is 120 miles: and it may be presumed, that this is the nearest and best route, because the road is so much used, that if not direct, it would have been made as nearly so as the nature of the country would permit. On the contrary, it may be truly said, that there is *no road* from Petersburg to Lynchburg, because there has been so little trade or travel from one of these towns to the other, that there was no necessity for obtaining the shortest route. Any one of the roads by which the traveller could now pass from Petersburg to Lynchburg, would be made up of several shorter roads connecting intermediate places, but each place lying considerably without the best or most direct route for the entire distance. Thus by connecting some of these roads, the present *nearest* travelled distance from Petersburg to Lynchburg, is 117 miles, by received computation: and persons well acquainted with the whole country, are decidedly of opinion that the distance could not exceed 110, if a road had been traced with the design of passing merely from Petersburg to Lynchburg. But admitting the uncertainty of all estimates of distance, based merely on opinion and computation—and claiming merely equal nearness from Petersburg to Lynchburg, (which cannot be questioned,) it will follow that New London, which is on the ridge, and in the direct best route to Abingdon, (and thence to Tennessee,) is as much nearer to Petersburg than to Richmond, as it is more southward in position than Lynchburg. The latter town is not only out of the proper route, but is surrounded by a very hilly country, which would make the construction of a railway *across the course of the streams* very costly—though it could be easily reached by a short branch from the railway, laid on one of the ridges between two of these streams—and which branch would be necessary, and sufficient, to accommodate the Lynchburg travel. Besides the advantages gained, in less distance and more perfect level, by keeping the railway route southward of Lynchburg, there would be thereby avoided any conflict of interest with the James River Canal—and besides, the more distant the road from the river, the greater would be its use and its profits, in transporting the produce of the southern counties, which have, and can have, no cheaper way of reaching their markets than this railway would offer.

Now, if the supposition that the length of the ridge railway route from New London to Petersburg would be 10 miles less than the one to Richmond north of the Appomattox—and that the more perfect level of the former gives it a further comparative advantage of 10 miles—then it would be clear that Richmond, *considered as the ultimate destination of both routes*, would be reached as cheaply by one as by the other—because 20 miles is precisely the distance from Petersburg to Richmond—and through which a railway will be completed before operations are fairly commenced on the great western route. The line of new railway which I advocate, would join the Petersburg and Roanoke railway about three miles from its eastern termination in Petersburg—and if that route was chosen, the town of Petersburg would doubtless, if governed by enlarged and sound views of self-interest, *permit the railways to be connected, and continued northward, without the least obstacle or detention.* Thus 24 miles *of what might be then considered as part of the great south-western railway*, at the Richmond end, would be actually completed and ready for use, and for that extent requiring no investment to be made, or risk to be encountered, by the new company.

But, suppose that I have overrated the balance of advantages, as to distance and level, of the southern route—and that 10 miles would be enough to allow, on either or both grounds, instead of 20 miles. This change would make Richmond 10 miles nearer by the northern ridge, than by the southern, *via* Petersburg. Even then the latter would still be the preferable route. The northern road, though shorter by 10 miles, would have to be constructed throughout, save about a mile next to Richmond. But of the other, 24 miles would already have been constructed by other companies, and would be at once available as part of the great south-western line: and 24 miles of *completed* railway is not so great an obstacle, as half that distance requiring construction—unless indeed the subscription and support were most abundant, and the profits of the investment great, and absolutely certain. The company owning the Richmond and Petersburg railway, have the strongest inducements to approve and to aid the adoption of this route—*as its being made the eastern link of the*

great south western line, would probably double the trade and travelling that it will otherwise convey.

According to the grounds assumed, it seems that by this plan the great *and indispensable* national object of a south-western railway may not only be gained for Virginia, but that, with that end, there will also be secured aid and profit to every particular existing interest, whether of towns, of back country, or of public works, and corporations owning them.

This rail road cannot abstract the least amount of transportation from the James River Canal—a public work which every Virginian ought to desire to be treated not only with *justice*, but with *liberality*, by the legislature—and neither to be crippled or endangered, by permitting the improper rivalship of other routes not essential to the public good. But a south-western railway *on some route* the public interest demands imperiously, and sooner or later, *it must be constructed.* This route, therefore, which can take away no trade from the canal, but will give to it much, (in commodities to and from Tennessee, through Lynchburg,) ought to be viewed by the powerful canal interest, not only without jealousy, but its adoption favored as the sure means of avoiding other schemes which would establish dangerous, if not fatal rivals.

An extensive and productive region of Virginia, which is now wretchedly provided with ways to market, will be able to use this main railway; and this supplying region will probably be much extended by a branch rail road from Danville to the main line.

Though the route here advocated will not pass through either Farmville or Lynchburg, yet branch routes can be constructed to both, that will probably serve private interests as well, and the public and general interest far better.

Of the immense amount of new or additional products, and of travel, which this improvement would transport from and to the south-west, different parts of the profits would fall into the hands of each of all the towns that have been named: and the share of each, would doubtless be much greater than all that it can possibly now receive from the same sources. Richmond, owing to her superior wealth, population, and more fortunate position, would of course receive much the largest share—and therefore she would act most foolishly to oppose this scheme, merely because her's was not the only market reached, and that her sister towns would derive highly important advantages. It is hoped that Richmond has views of interest sufficiently enlarged not to be governed by any petty and illiberal jealousy of weaker competitors. *If she fears rivalship, let her look to Baltimore:* for if we lose time in disputing about the proper route, and the proper distribution of profits among the towns claiming shares, that enterprising city will extend her lines of trade quite across Virginia, and tap the very sources of the wealth now offered to our acceptance, before we shall have determined through what channel it may be permitted to flow.

A convention has been called to meet at Charlotte Court House on September 5th, for the purpose of discussing the expediency of constructing a rail road from Danville to Farmville, and thence to Richmond. It is earnestly hoped that the invitation will not be slighted—that the meeting will be attended by men of zeal and intelligence, disposed to act and to aid, as well as to propose and to debate, from all the neighboring counties—and that, when there assembled, they will give due consideration not only to the particular scheme to which their attention was first called, but also to this and other schemes, for a railway connexion with the south-west.

It is a circumstance as gratifying as it is novel, that the people of the country are already moving in this matter, with zeal and effect. Let them but continue to exert all their energies, and they will not fail to attain whatever object they may determine to pursue. The *country*, heretofore, has done nothing in commencing, or directing the routes of rail roads. They have been commenced, and directed entirely by different towns, and solely with views to their own particular advantage. Of this we have no right to complain. Those who plan, and mostly pay for, a great and expensive work, have a right to direct it so as best to secure their own interests. But if the *country* will shake off its inertness on this subject—and will bring into exercise the dormant forces of its influence, wealth, and power, this great work will be so shaped as best to promote the general prosperity of Virginia.

To the consideration of the individuals who will meet for this purpose at Charlotte court, especially, I beg leave to recommend these views.

R. N.

August 7th.

[As the subjects treated by the two foregoing pieces are now engaging much attention, and the interest felt, recently as it has been excited, is rapidly increasing and spreading, we have thought fit to send forth some extra copies of this sheet, to the towns and counties most interested in both these schemes of improvement some weeks in advance of the regular issue of the Sept. No. of the Farmers' Register. We are willing to sacrifice something of the novelty and interest of this No. by thus anticipating parts of its contents, hoping that it may induce earlier reflection, and more deliberate action, on these subjects, which are so important to the welfare of Virginia.

We take this occasion to remind civil engineers especially, and all other persons who have devoted attention to the subject of canals, railways, and other public improvements, that the full consideration of this subject was always one of the objects embraced in the plan of the Farmers' Register—and has been deemed second only in importance to matters of instruction on practical agriculture. Well digested views presented in original communications for this journal, on any of the plans for facilitating transportation, which are important to the public interest or to particular regions of considerable extent, will at all times be gladly received, and given a *durable* as well as an early place before the public, by being embodied in this work.

The Presidents of incorporated companies directing canals, railways, &c., would aid this general design, by sending concise statements of the present state of their several works; and in future, notices of all such new occurrences, as are necessary to be known, to enable us to keep our readers correctly informed of the progress of all our valuable works for facilitating transportation. Ed. Far. Reg.

ON CURING TOBACCO.

To the Editor of the Farmers' Register.

I ought before to have redeemed a pledge I gave in a former communication, that I would, in due time, say something upon the subject of curing tobacco. But the great draught on my time, which is unnecessary here to state in detail, has prevented it. And, indeed, there are so many cultivators who eclipse me, and (by close personal attention, which I cannot give on account of the extent of my business,) understand the minutiæ of it better than I do, that I really feel some delicacy in the attempt. I will, nevertheless, endeavor to explain the general principles upon which the process ought to be carried on, which, in truth, is nearly all that can be done in the compass of a communication not too long to be read. It may be of some use to those who are novices in the business.

In the first place I will remark, that the sap in tobacco contains more oil than any plant with which I am acquainted. The whole art, then, consists in evaporating the water from it, so as to leave it in the purest possible state, and the greatest quantity. To effect this, it is all-important to let it be as ripe as possible before it is cut. I believe it may be assumed, that nine out of ten cut too soon, though the number of them has been diminishing, since the dealers in the article have taken up the habit of admonishing them. The first step it takes is to assume yellow spots. This should begin in the field, if it does not fire so much as to make it necessary to save it from destruction, and many are induced to cut it for this cause, when perhaps a change of weather, from wet to dry, might stop it, as it frequently does. But this question can only be settled by observation and reflection. Although it assumes the yellow spots in the field, it is still proper to let it stand two, three, or four days, according to circumstances of heat and moisture in the atmosphere, when if it ripened green in the field, which it will sometimes do, it should begin to assume these yellow spots in the house. The firing should then commence in a very small way, and be very gradually increased for several days, till it will bear such a degree of heat as will cure the thin parts of the leaf, and the small fibres. It should then rest a day or more, to allow the stems and large fibres to diffuse the sap which is in them, and afford an opportunity to evaporate the water, and leave the oil in the leaf, where it ought to be. But when the process of firing is commenced, the tobacco should never be allowed to get in high order till the stems are cured. After this is done in great measure, it is well to let it rest again, and send out the remaining sap to gain as much oil as possible in the thinner parts of the leaf. Let it be noted, that whenever the tobacco suffers for want of fire, it will be known by the "strutting" of the leaf, which should never be suffered after it is first "limbered" by the sun when it is cut. The strutting of the stem is produced by the flowing back of the sap from the leaf into the stem which it has a tendency to do when it requires heat. It is this which impoverishes the leaf along the stems. During the early part of the process of curing, care should be taken to let it have air, otherwise it will sweat, and the oil will be cooked in the water, instead of the water being evaporated from it. To this end it should be hung thin, say, in large tobacco, not more than nine plants on a stick, and the sticks 8 or 9 inches apart at least, according to the size of the tobacco. During the first resting spell indicated above, if house-room be scarce, it may be re-hung by putting the plants from four sticks on three, or three upon two, as the case may be. This saves room and fire too.

The reasoning above is to show the necessity of heat in curing. As far as the sun can be substituted for fire, it is proper to use it, more especially when it is first cut, when it should be kept on a scaffold as long as it is safe from rain. But when there is a very full crop for the hands, it is hazardous to trust too much out at once. The judicious plainter will regulate this by circumstances. I once saw a crop of eight hogsheads sell for nearly double the price of similar tobacco, because it was cured by natural instead of artificial heat, in houses entirely open (as it was said) on the south side, the weather being favorable for the object. It is unnecessary to state that the manufacturers prefer that which is cured with as little fire as possible. It is difficult, however, to cure a large crop without a good deal of fire. It may be well to observe, that tobacco, like bacon, is cured in a variety of ways, by different persons; while some will be good in each way.

There is little doubt that the foregoing observations will be criticised by some who may perhaps understand the subject better than I do. If so, my object will be attained by eliciting the practice of others. Something may be gained by adopting parts of each, or letting each pass for what it is worth.

While I have dwelt on the quantity of oil contained in tobacco, I have said nothing of another ingredient which it contains in large proportion, viz: saltpetre. It is very common in rich tobacco, to see it exude from the stems so as to make it white with pure saltpetre. This, however, when it is seen on fine tobacco, is a proof that it was not sufficiently fired; because it ought to be expelled from the stem and circulated in the leaf, where it should be incorporated in the oil. As a proof of the quantity of this ingredient, I will mention a fact within my own knowledge. During the revolutionary war, my father was in the habit of boiling his tobacco stalks, and pouring the water into a number of rough trays, with pens of sticks rising to the surface of the water, to which the saltpetre attached itself in delicate spangles like icicles. This was stroked off into a dish in its pure state. In those days, there was more carelessness in curing than at present, otherwise the saltpetre would not have been allowed to remain in the stalks in so large quantity.

Before I close this communication, I must warn such as gave credit to my former communication on the subject of packing plant land for burning at a future day, that in several instances my last effort failed. In the month of October a rain fell, which wet the land under the brush and wood more than I had supposed. A threatening prospect for more induced me to set fire to them, and several that were wetter than the rest made a poor turn-out. If I had waited till November, as I generally do, a dry spell had put them in fine order. Another evil also attended them. The unprecedented quantity of rain which fell during the winter, forbade my chopping them lightly again before sowing, and the ground became too compact. This would not have been the case if they had been made rich enough. I

shall hereafter endeavor to pen my cattle on them in the spring before the grass seeds, and before the brush and wood is put on, or make them much richer with manure that has no seed in it.

A PLANTER.

REMARKS ON THE (SUPPOSED) GYPSUM DISCOVERED IN NEW YORK, AND THE PROBABLE EXISTENCE OF A SIMILAR SUBSTANCE IN WESTERN VIRGINIA.

To the Editor of the Farmers' Register.

Big Lick, Botetourt, Aug. 6, 1836.

I have met with nothing recently, which has surprised or puzzled me more than the recent developments in New York, respecting the rock in Moore's well, and the principal *plaster* beds in the State. It brings to life exploded theories, which, a few years since, had many supporters in the Valley of Virginia.

There are numerous localities in this country, where the limestone crops out at the usual angle with the horizon, but from peculiar causes, not well understood, is subject to constant and rapid disintegration. It is softer, and from the inexhaustible fertility which it imparts to the ground over which it is scattered, it has been supposed by many, to possess the virtues of gypsum. By the farmers it is called rotten limestone, and some have had it pounded, ground, and sown, as is customary with plaster, and claim for it equal activity. The experience, however, is so limited and contradictory, and the lights of science so adverse to its efficacy, that until the arrival of your last No., (3rd,) I have had no hesitation in attributing, what seemed to be the effect of the powdered carbonate, to other influences. I cannot, for a moment, believe, that either the carbonate or sulphate of lime, sown over the ground in the usual quantities, can be of any value, mechanically. Their attraction for moisture, when pulverized, has had an importance attached to it which ignorance alone could have encouraged; for, aside from their solidifying what they absorb, how triflingly inconsiderable must be the moisture attracted by a few handfuls of dust scattered over an acre of ground. Gypsum being soluble in from 300 to 500 parts of water, and being found by analysis an important constituent of those plants upon which its action is most striking, enables science to unfold its mysteries with tolerable clearness. But the *carbonate* being insoluble, seems to cast an impenetrable veil over its *modus operandi* if we admit its influence upon vegetation to be the same with plaster. We are always backward and unwilling to admit what seems to be at war with the settled principles of science, and yet we are every day encountering stubborn facts, before which, speculation must give way, and to which, principles, however revered for their antiquity, or stamped with value by the approbation of the wise and the learned, must accommodate themselves. Now, it has been a received opinion, that the carbonate of lime is insoluble; the correctness of which, is sustained, not only by the ordinary chemical experiment, but by the fact that the soil throughout the Valley of Virginia, and other timbered calcareous regions, even when lying in immediate contact with limestone, affords upon analysis, not the slightest evidence of the existence of lime. For this last remarkable fact, we are measurably indebted to your experiments*. In vegetable physiology too, it is unquestioned that plants receive their nourishment, either in a gaseous form, by absorbing it through the leaves, or by imbibing it in a liquid state, through the minute spongeoles which terminate the roots. From all which facts, viz: its quality (i. e. the carbonate of lime) of solidifying the moisture it absorbs†—the absurdity of expecting a mechanical effect from the small quantity sown over the surface, its insolubility, and the impossibility of any substance acting directly as a *pabulum*, or by stimulating and exciting the digestive organs of the plant, which is not soluble, it follows that the carbonate of lime can exercise no influence upon vegetation, unless put upon the soil in such quantities as to change its constitution by mechanical division. Such is the conclusion to which the lights of science would seem to lead us. In opposition to which, we have the fact before us, whichever way we turn, that the springs which rise in, and the streams which flow through that country, the soil of which affords, upon analysis, no lime, are strongly impregnated with it, and deposite it in the form of argillaceous marl wherever the stream is small, and exposed by ripples to the action of the atmosphere. Even those immense parapets of *travertin* in the neighborhood of the Sweet Springs, which excited the amazement of our U. States Geologist, Mr. Featherstonhaugh, and which he seemed to consider, in his communication to you, as almost anomalous, but which are by no means uncommon, are the undoubted deposites from the streams in their vicinity, which must have imbibed their calcareous qualities somehow or other, from the soil through which it percolates in forming springs. This would seem to say lime was a constituent of the soil, and without question exhibits it in a dissolved condition. Whether in the secret laboratory of nature it undergoes modifications, we cannot detect, or how it happens, it is

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* The *carbonate* of lime—the form, which is presented in limestone—was found to be almost always absent, in such cases as are above named—and such was the novel and strange fact stated in the Essay on Calcareous Manures. But *lime*, in some other combination than the carbonate, was supposed to be always present in soils touching limestone.—See pp. 20, 21, 2d Ed. ED. FAR. REG.

† Water is not *solidified*, when absorbed from the atmosphere, either by pulverized carbonate of lime, or gypsum not calcined—as any so absorbed is not chemically combined with either. The power of absorbing water, in both, is by such action as any pulverized matter would exert, and is but feeble, compared to some other earths, or mixtures of earth with putrescent matter. But pure or quick lime, combines chemically with a certain and a considerable proportion of water, in slaking, and solidifies it, as the slaked lime may be as *dry* as any thing can be, and yet hold this large proportion of water. All gypsum is already supplied with its solidified water—it forming one of its uniform component parts. This water is dispelled by calcination, and would be again absorbed (and in that case solidified) if the calcined gypsum was scattered on the surface of the earth. ED.

impossible to say; but so it is*. Other facts opposed to the *scientific* theory of lime, are afforded by the interesting communication alluded to in the first part of this letter, respecting the plaster beds of Chillenango, Phelpstown, Wheatland and Cayuga, in New York, in connection with the experiments which have been recently made upon the calcareous rock taken from Moore's well; facts which, if true, involve a contradiction, while they confirm the impression in this neighborhood, that the rotten limestone is as efficacious as plaster.

Your New York correspondent calls upon you to clear away the fog which surrounds him and his fellow citizens on this subject. With equal propriety, may we of Botetourt call for aid in this truly perplexing matter—not only perplexing, but deeply interesting; for, if it be true, as your correspondent suggests, "that the mechanical operation of grinding or pulverizing crude or unburnt limestone, renders it equally fertile with gypsum," the benefits which will flow to this country, from its discovery, can scarcely be estimated.

W. M. PEYTON.

P. S. Since writing the above, I have received your 4th No., and find that the opinion of your New York correspondent respecting the rock from Moore's well, is confirmed by the analysis of Professor Silliman. I am surprised that the singularity and importance of the circumstances connected with his experiment, did not attract his attention. He has left us, from our confidence in his skill and science, in a most inextricable labyrinth. He suffers the anomalous character claimed for it to pass without comment; and proves, by analysis, that it is not only a mere carbonate, but that it contains only 50 per cent. of lime, the residue being an aluminous residuum, without the least plaster of Paris. I hope the remarks in your 4th No. will meet his eye, and induce him to investigate and treat the subject with that fulness and perspicuity for which his abilities and science so eminently qualify him†.

W. M. P.

August 7th, 1836.

*The carbonate of lime is indeed, as stated by our correspondent, insoluble in *water*—but *is soluble* in water impregnated with carbonic acid. Besides the various other natural means of carbonic acid being given to earth and water, all rain water contains some, as it falls to the earth—and therefore, there are abundant means thus furnished, by which carbonate of lime, (then become the super-carbonate, by being combined with excess of carbonic acid,) may be dissolved, and held in solution in water. It is in this state that all limestone water holds lime. And when the excess of carbonic acid is expelled, (as is easily done,) by heat, or by exposure to the atmosphere—which last occurs mostly at the water-falls and ripples—then the lime, restored to the state of carbonate, being insoluble, is precipitated, and forms a deposite of soft limestone, or *travertin*.

† We concur heartily in the wish of our correspondent to obtain light from this abundant source. As the matter now stands, with Professor Silliman's statements of the analysis of the earth in question, the facts are incomprehensible—and would be to us incredible, except for the supposition that there are causes of action not yet discovered. Ed.

PROCEEDINGS OF THE MINERALOGICAL SOCIETY OF VIRGINIA.

To the Editor of the Farmers' Register.

By order of the Mineralogical Society of Virginia, I send you the enclosed extracts from its minutes, respectfully requesting that they may be published in the Register.

Most respectfully
your most obt. &c.
W. S. MORTON, *Sec.*

August 16th, 1836.

At a meeting of several gentlemen, held at Prince Edward Court House, on Saturday, July 23d 1836, for the purposes hereinafter mentioned, Dr. W. B. Smith was appointed Chairman, and Dr. B. F. Wilson Secretary.

The objects of this meeting were, to consider, what measures are most likely to develope an intimate and extensive knowledge of the mineral wealth of the state of Virginia, and to put into operation such means as may tend to render those resources available to the purposes of public good.

Every day adds its testimony to the great amount of the mineral wealth of this state, both in the precious metals, and also in those which are more common, but not the less valuable—as coal, iron and copper. In all sections, there are abundant indications of the presence of rich ores, which were either formed *in situ*, or rolled from the highlands by water courses. The discovery of gold is an example, and the careless but profitable manner in which mining operations for obtaining it are conducted, is an earnest of the value of a more rigid and accurate survey. All over the country, the inhabitants are continually finding various mineral specimens, upon their own estates, and for want of that species of knowledge, requisite for determining the composition and value of such specimens, they are thrown aside and forgotten, or only referred to as matters of curiosity. There is no kind of institution in existence, where such minerals might undergo a faithful chemical analysis, and the owners of the lands on which they are found, informed of their real worth.

Geological surveys are for the purpose of defining the great and more striking features of the structure of a country. Operating over a large extent of surface, they are necessarily of too superficial a character to be of benefit to private persons, and the owners of smaller estates. Nor is it possible, however high may be the scientific acquirements of those who conduct them, that they should become acquainted with all the minor features of the mineralogy of a district, a knowledge which however is of the greatest interest to individuals. To obtain an enlarged, and at the same time, a very intimate knowledge of this kind, every citizen must become his own geologist—he must collect the minerals in his own neighborhood—annex to them a clear and distinct account of the circumstances under which they are found, or their locality. And the *next point* is, to have them identified, or chemically analyzed, and their value ascertained.

This important *point* fell under the consideration of the meeting. Analytical chemistry, which is the science furnishing the knowledge necessary, is not taught as a branch of education in any of the public institutions of the United States, and those persons who are acquainted with it, have

almost entirely obtained their knowledge of it, in foreign countries. The number of such, of course, is very limited, and totally inadequate to the demand. The meeting therefore was fully impressed with the high importance, to the public, of providing ample instruction, by the immediate establishment of a school of chemical analysis,assaying of metals, and all those operations which are concerned in the determination of the value of minerals and ores.

The prospects of encouragement for such a school are not small, because its utility is apparent. With the more opulent classes, the acquisition of these arts would be sought, for purposes of private benefit, and those who might wish to pursue them as a profession, would be induced by the certainty of a very lucrative occupation. In all parts of the United States, there are abundant openings for the enterprise of men who are thoroughly acquainted with mineralogy and chemical analysis, and at present, from the Atlantic to beyond the Mississippi, they would meet with no kind of competition; an assertion that can be made of no other profession. The public benefit too, which must accrue from the general pursuit of these investigations as a livelihood, will far exceed that which results from labors of a few solitary scientific men, who carry them on, only as a transient occupation. In other countries, they have been of immense benefit, and scientific chemists of the highest reputation, have been brought up in these institutions. And, if these things have happened in Sweden and Germany and other parts of Europe, where these schools have been publicly encouraged, and the mineral resources of those countries thus conducted in a flourishing and profitable manner, why should not the same happen in America?

It is hoped by the establishment of a school in which all subjects in any manner connected with mineralogy are taught, and especially practical instruction afforded in chemical analysis, that arrangements might shortly be made, for a systematical analysis of the Virginia minerals. Gentlemen residing at a distance, and finding specimens on their estates, might have authentic information of their composition, furnished from the labors of the pupils of this school.

With reference to the pupils themselves, no one, of course, without some previous knowledge of the general principles of scientific chemistry, would be able to commence in this department. Graduates of respectable colleges, and those who had attended full courses of lectures, would find their acquirements, in this particular, sufficient as a commencement. To make provision, however, for such as might be desirous of entering the school without any previous preparation, suitable arrangements could be made, by which that amount of preliminary knowledge might be acquired at Hampden Sidney College.

To that extensive portion of the community engaged in agricultural operations, the establishment of a school of this kind, holds out many advantages. The planter and farmer, from the nature of their daily pursuits, have abundant opportunities of acquiring a very intimate local acquaintance with the rarer minerals, on their own estates as well as those of more common occurrence. To instruct such, in the mode of ascertaining the composition and value of such specimens, is to give them a source, not only of pleasant recreation, but also, occasionally, of pecuniary profit.

Being impressed with the importance of this subject, the meeting proceeded to organize itself into a society, to be known by the name and title of the Mineralogical Society of Virginia. A constitution was adopted, and the following gentlemen elected officers:—Richard N. Venable, Esq. President; Dr. W. B. Smith, Vice President, and W. S. Morton, Secretary.

The Society then proceeded to engage the services of John W. Draper M. D. as its chemist and mineralogist, an appointment deriving advantage from his knowledge of the geology and mining operation of South America. As a very high assurance of his acquaintance with analytical chemistry, the following note is subjoined from the celebrated Dr. Turner, Professor of Chemistry in the University of London, and author of the work which is so extensively used as a text book on chemistry, in most of the universities and colleges of the United States.

"I hereby attest that Mr. Draper assiduously attended a complete course of my lectures on Chemistry in this University during the years 1830—31, and at the close of the session gave decisive proof of the success of his exertions, by obtaining a high certificate of honors, after a full examination in writing. I know that he has likewise pursued the practical parts of chemistry, by private study, and that he is well qualified for any situation connected with the practical applications of chemistry."

B. Turner F. R. S. Lon. & Edin.
Professor of Chemistry.
(University of London.)

The Society's chemist was then directed to proceed at once with the organization of the school; and at an early opportunity, to announce to the public, the particulars.

In reference to the foregoing, we the undersigned, fully and heartily agreeing in the object and determination of this society, recommend it to the cordial encouragement of our fellow citizens.

D. S. Carroll,	Noble Snell,
Geo. H. Matthews,	Saml. C. Anderson,
Wm. A. Hughes,	James Madison,
Thos. S. Flournoy,	Saml. Branch,
Chs. Smith,	Geo. A. Baxter,
F. N. Watkins,	Stephen Taylor,
Wm. I. B. Bedford,	W. Berkeley,
Saml. R. Simpson,	Henry N. Watkins.

[The design set forth in the preceding article is highly worthy of commendation—and we earnestly hope that its results may be profitable, as they certainly will honorable, to the individuals to whose public spirit and intelligence the execution of the plan will be due. For several reasons, there is no region of Virginia, which offers more suitable ground and facilities for these efforts, than the county of Prince Edward. One most important object, and which offers every prospect of success, is a proper search for coal. A thin seam near the surface has already been found—and as this region certainly overlies part of the great coal formation, there is every reason to hope that borings sufficiently deep may reach a seam of much greater

thickness and value. Such a discovery would not only exhibit a treasure on that precise location, but would indicate its far greater extent. Though the proprietor of the land first examined might derive the earliest benefit, and therefore ought to bear a large proportion of the expense of the experiment, the profitable results would be a thousand times more extensive. Besides the land holders through all the adjacent country, the Appomattox navigation interest, and especially the trading interest of the town of Petersburg, would derive most important benefits from such a discovery—and therefore the persons connected with such interests may well afford to aid the labors of the Mineralogical Society, if directed in part to this object.]

For the Farmers' Register.

ON THE EFFECTS OF LONG CONTINUED USE OF CLOVER AND GYPSUM, WITHOUT OTHER MEANS OF IMPROVEMENT.

Mr. Peyton, in his communication to the Register, for July, imputes to me error in relation to the long and continued application of gypsum, unaided by other manures. Having observed from several papers in the Register, that the writers seemed to consider gypsum a means of permanent improvement, I thonght proper to state what I apprehended to be the effect on my own lands. I should be well pleased to find I had been mistaken.

Chemistry applied to agriculture, has been among the improvements of the age, and though men of science, by analysis, have discovered many of the elements of matter, I think much has escaped their searching enquiries. I am always willing to pay tribute where tribute is due, and concur with Mr. Peyton, that the world is largely indebted to Sir Humphry Davy, and the Count Chaptal, for their labors and discoveries; but I have never been satisfied with the theory of Knight, though sanctioned by the Count, that in the districts in England, where the application of gypsum has been found to be inert, that it resulted from a superabundance contained naturally in the soil. If this theory was right, I should suppose that clover, and other plants apposite to gypsum, would flourish by its power contained in the soil. From one to two bushels of gypsum has been supposed, by those who have been well practiced in its effects, to be as efficacious as any additional quantity, but I have never heard that an excess, however great, has proved deleterious. In this respect it seems to assimilate to marl. Mr. Ruffin, in his Essay on Calcareous Manures, states, as the result of experience, "that clover, red and white, will flourish on spots most injured for grain crops, by marling too heavily." Count Chaptal, who seems to have added practical experience to his theoretical speculations, asserts that gypsum acts as a condiment, or spice, to the digestive organs of plants. If his theory be true, and we receive what general experience seems to have established, that a redundancy of gypsum is in no way injurious to clover, when artificially applied, it may be reasonably inferred, that it either rejects, or throws off the superfluity. Analogy to animal economy, seems to favor this position. Medicine is useful in sickness, and food indispensible in health; but the reception of too large a quantity, instead of imparting convalescence in the one case, and vigor in the other, will lead to disease, and sometimes death; and if the organs of the plant be capable of performing this salutary operation, when an excess of gypsum is artificially applied, I can see no cause why she should not exercise the same function where an excess of the gypsum exists naturally in the soil.

Lands on the Eastern Shore of Maryland, which do not profit by the application of gypsum, as far as my observation extends, in their natural state, are least favorable to the growth of clover, red or white, or to Indian corn. They are stiff, white, clayey lands. When highly improved by putrescent manures, for a short time they will produce rich crops of red clover, but it disappears after the first cultivation, and is rarely succeeded by a growth of white; and a rich dressing by putrescent manure does not seem to bring into action any property which was dormant in the soil. If, as Mr. Ruffin alledges, a dressing of putrescent manures will restore to healthy action lands which have been surcharged with marl, the same result might be expected, when they hold a surfeit of gypsum naturally existing in the soil or artificially applied. If the reasons given by Sir Humphry Davy for the inaction of gypsum, on soils in England, apply to those of America, I doubt its correctness: nor have I entire confidence in the correctness of Count Chaptal's theory in relation to the action of gypsum on plants.* The speculation is ingenious, but I think the mystery still remains unresolved. In stating these causes of doubts, I hope to escape the charge of presumption. I say, in truth, that I am an unlearned man. My pursuits have led me into paths wide of the delightful science of natural philosophy. My opinions are the results of my own crude reflections and a very limited experience.

I find, by referring to my essay in your No. for May, that I said, as I intended to do, that though my crops of wheat were greatly diminished, that corn grew well and clover flourished; and as Mr. Peyton suggests, by a more intimate knowledge of my course of cultivation he might be able to ascertain the cause of failure, I will make a statement somewhat more minute. My farm lies on a salt water river: the soil friable, with a red clay bottom. Under a high state of improvement, it will produce from twenty to thirty bushels of wheat, and from forty to fifty of Indian corn to the acre. This I have ascertained from small portions which

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*No theory of the mode of operation of gypsum, as manure, that has yet been published, is at all satisfactory. But even though the action of gypsum may continue to be inexplicable, its *inaction* may be plausibly accounted for under certain and various circumstances. As it is well known that *only a limited quantity* can act as manure, and that any excess above that quantity would be totally inoperative, Davy's explanation of its inertness, on soils known already to possess gypsum as a natural ingredient, is amply satisfactory. On the other hand, our poorest lands, which are totally devoid both of calcareous earth and gypsum, are as little benefited by the latter. On the supposition of *oxalic acid* being present in such soils, a reason for gypsum not acting is equally clear, as we have explained at length elsewhere. See Essay on Cal. Man. pp. 92, 93, 2nd Ed. Ed. Far Reg.

I have highly manured. I commenced farming by dividing into five fields. I planted one in corn, and prepared a fallow, on both of which I sowed wheat, clover seed in the spring on my fallow, and strewed plaster the two succeeding springs. I most generally prepared a fallow of one of my clover fields, two or three times perhaps of a stubble field. I had continued this course for fifteen years, and had strewed each field four times with gypsum before I began to perceive a diminution in my crop of wheat, and it attracted my particular attention. The wheat come up well, and promised a good crop in the spring; but the stalk shot up spindling, the blade died prematurely, the head was short, and the wheat defective when cut. My system had become, from long practice, easy and familiar. It was not costly. It had been very profitable, and was not lightly abandoned; but as I thought, and still think, from the proof of experience, not until the good effect of gypsum had ceased. I am drawing marl at the expense of $12 per week, and if gypsum would act on my lands, with its former effect, I should be pleased to save the cost and trouble. The experience which Mr. Peyton refers to, in Eastern Virginia, is entitled to much respect; but I do not attach much importance to that of Pennsylvania. I have a personal knowledge, that on most of the wheat-growing lands there, in addition to gypsum, they use lime liberally, and do not neglect putrescent manures; and I have understood, that in Western Virginia, in farming, Pennsylvania habits prevail; and it will be recollected, that the proposition I stated was, that a long and continued course of clover and gypsum, unaided by other manures, would prove injurious to the wheat crop.

Mr. Peyton apprehends that my doctrines are calculated to do mischief: if they be so, I have fallen into a great error. My intention was to do good. I feel a deep interest in the agricultural prosperity of the country. The old aristocracy is generally worn out, both in fortune and intellect, and I deem it most important, that a solid, substantial, and enlightened class of agriculturists should be raised up, who may serve to check the inordinate spirit of schemers, gamblers, and speculators; for it is a fact, as lamentable as true, that even in this land of liberty and equality, few men, however high their morals and intellectual faculties, can attain and exert their proper influence in society, if clogged with poverty.

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From the Shrewsbury, (Eng.) Chronicle.

IMPLEMENT FOR MILKING COWS.

We were much interested lately in attending a meeting at Withington, near Uttoxeter, of farmers and others, convened by William Blurton, Esq., of Field-hall, for the purpose of exhibiting and explaining an invention of his, for milking cows. Mr. Blurton is already known as the author of several useful inventions connected with farming and dairy pursuits: for one of which, "the swing cheese frame," he received a medal from the Society of Arts. On the present occasion, a numerous and very respectable party, from various districts of the county, and even from Shropshire and Derbyshire attended. An excellent and substantial dinner was served up soon after one o'clock, at the Sadler's Arms. Mr. Blurton presided at one table, and Mr. Hamp, of Walton-upon-Trent, at the other. After dinner, Mr. Blurton exhibited the "milking syphon," for which he has obtained a patent. It is a small metal tube, with a syphon at the lower end, and on its introduction into the teats of the cow, the milk flows freely out of the udder, without any manual labor. Mr. Blurton spoke in a very modest and becoming manner of his invention, wishing its utility to be proved by experience, rather than be taken upon the credit of his assertion; though he expressed himself rather confidently that, after a trial, most dairy farmers would prefer its use to the present method of milking by hand. Two objections, which had occurred to the minds of several, that the cows might be injured by the use of the syphon, and that its introduction might cause a constant discharge of milk, Mr. Blurton, met by saying experience had proved them to be groundless. Mr. Ritchie, a veterinarian surgeon present, gave it as his decided opinion, that cows would not be injured by the use of the syphon. Mr. Blurton's cowman was called into the room, and any gentleman was allowed to interrogate him. He answered many questions, and said that he could milk 16 or 18 cows in an hour with the syphons, and would much rather milk 16 with them than 6 without them. Several cows were afterwards milked in the yard with the syphons, and though on account of the number of persons who crowded round them, the experiment was tried under rather disadvantageous circumstances, every one appeared astonished at the easy manner in which the milk was extracted from the cows by this new process. In consequence of being disappointed by the manufacturer, Mr. Blurton was unable to supply the company with syphons: but we understood he would shortly have an ample stock of them. We do not say that every objection, or every degree of prejudice, was removed by the exhibition of the invention in actual operation; but it will now have a fair and extensive trial, which we are disposed to thing will be successful.

[The foregoing article may, perhaps, furnish another instance of such facts as our friend, Gideon B. Smith of Baltimore, recently communicated, and properly commented on in this journal—viz: of American inventions, which had failed to attract notice here, being re-discovered, (or possibly "pirated") in Europe, and thence introduced in this country as both new and important. We remember that the principle of this invention was announced, and many statements concerning the practice furnished in our newspapers, years ago. It was then stated to be due to a Yankee boy, who used such simple tubes as bits of rye-straw would make. The operation of drawing off the milk was considered, at first, perfect, and free from all objection: but subsequently it was found that internal irritation was often produced by introducing the straws. This ill effect, however, might well be produced by the sharp or rough edges of cut or broken rye straws, and not by the smooth and rounded extremity of a metallic tube: and this change of material may serve completely to remove the former practical objection to the plan.]

COMMERCIAL REPORT.

So little business is transacted at this season of the year, that it is almost superfluous to say any thing on the subject. If intelligent country gentlemen would report the state and prospects of the crops of grain, cotton, tobacco, &c., such communications would be much more interesting than any thing relative to the present course of markets.

Our millers should now be receiving abundant supplies of wheat, but such is the deficiency of the crop, that many of them are idle, and none fully employed. The quality of the grain is such, that the Virginia millers cannot expect to sustain the high character of their flour, nor to do a profitable business. There will scarcely be any surplus for exportation to the northern and eastern states, if indeed there be sufficient wheat to serve the demand at home, and furnish seed for the next crop. Such a failure has, probably, never before occurred.

In the western states, and particularly in those north of the Ohio, the wheat crop is said to be good. The price of western flour in New York is, $7 a 7½ per bbl., and engagements to some extent have been made for future deliveries of flour in N. York, at about these rates. In Richmond, a contract for city mill flour is reported to be made at $8½, and in Petersburg, the little good new flour that has been ground, commanded $9 for home use. The price of wheat ranges so widely, according to quality, that it can scarcely be quoted. The best, which in ordinary seasons would be considered scarcely merchantable, commands $1 50 per bushel, and a very small portion reaches this standard. The importation of wheat from Europe, during the present year, may be computed at a million of bushels, and large supplies are expected in the next two months.

Tobacco has declined materially during the present month, and is now 15 to 25 per cent lower than it was a few weeks ago, particularly the inferior sorts. The total quantity inspected in Virginia, is less than last year, and shipments to Europe go forward slowly. Prices may now be quoted $4 to 9, not embracing the extremes. There is a prospect of a large and fine crop of the present year's growth, and a great excess in the western states. So that low prices may be anticipated during the next season.

The receipts of cotton have almost ceased, and the stock inthe U. States is now reduced to nearly its minimum quantity. All markets have recently been dull, without any considerable variation in price. In Petersburg, 14 to 17½ cents have been paid, and the extremes in the large markets are 12½ to 21 cents. The prospect of the growing crop is reported to be not very favorable, save in Tennessee, and the extent of it will much depend on the continuance of warm weather during the next two months.

Considerable pressure for money has continued to prevail in the northern cities, and most descriptions of stocks are low. Exchange on England 7½.

X.

August 23, 1836.

WHEAT OF THE LAST CROP GENERALLY UNSAFE FOR SEED.

It is now manifest to all that the unfavorable opinions of the wheat crop, which we expressed in the two last Nos. were not mistaken or exaggerated, as probably most readers then supposed them to be. The quality of the grain, throughout the Atlantic States, is as defective as the quantity. It is generally shrivelled and very light, and will yield but little flour, and that of inferior quality. The few exceptions that exist, either in entire crops or parts of crops, in which the grain is of much better quality, are in cases of earlier ripening, or of some other cause, having prevented some of the great exposure to wet weather, when in the growing state. But the very small proportion of the whole crop that has thus partially escaped the general injury, would not suffice to furnish good seed to the country requiring it, even if all could be used for that purpose: and it will *not* be sold for seed, to much extent, because the great demand for good flour will cause almost every farmer, who has some good or middling wheat, to sell all except his own seed to the miller, as the most ready and profitable purchaser. We all know how inconvenient and unsatisfactory in general, to both parties, are purchases of seed wheat—and every farmer endeavors, as much as possible, to avoid being either buyer or seller of seed, to any considerable extent. If these objections exist when crops are generally good, they are magnified an hundred fold when so little grain can be had that is worth using for seed. There is then, by the failure of the last crop, a new and alarming evil, in the want of good seed for the next: and this evil is of enough importance, not only to affect the interest of numerous individual producers of the crop, but the consumers, and the public. The evil which we fear and expect is not so much the great cost and difficulty of obtaining good seed, but in the loss of crop that will be caused by trusting to bad seed.

It is true that wheat and other seeds which are much shrivelled, or otherwise of very base quality, will sprout and grow, and their produce *may be* perfect and well matured. It is one of the many laws of the Creator, in which a benevolent and preserving care is manifestly and wonderfully exhibited, that the germinating power is the last to be destroyed by causes that injure seeds. When they have been gathered so green, or have been exposed to such other disasters as to be good for nothing else, seeds will yet serve to continue their kinds in future growths. The moth-weevil that eats the inside of the grain of wheat until, apparently, nothing is left but the empty skin, still avoids the sprout, and leaves to it a power, however feeble, of producing a living plant. But though the preservation and continuance of the species is thus well provided for, it is a dangerous error to suppose (as many practical farmers still do, as well as mere theorists have done,) that if seed will *sprout*, it is sufficient for it to produce a good crop. The whole interior substance of seeds, serves for the first nutriment of the young plant, and is converted into a kind of milky fluid, for that purpose—and no other kind of food for plants, however rich and abundant, will serve as a substitute for this, during the early stages of growth. Compared to spring-sowed seeds, wheat remains very long in what may be called the first stage of growth—and therefore, can still less dispense with the store of its first and proper food which nature has provided in the grain itself. The want of this food would be severely felt even on the richest soils—and far more so on the poor.

What then is to be done in the present very general deficiency of grain fit to be trusted as seed?

No complete remedy, for the country at large, can be found. Good seed wheat, not mixed with seeds of weeds, is always difficult to obtain—and still more by

orders sent to distant places; and when brought in vessels, and of course in large bulks, heating could scarcely be avoided to such extent as would impair the value of seed. These dangers, still more than the high price, will forbid importations of seed from Europe, or from the north-western states, where the crops are good. Still, in some particular cases, one or both these means of supply may be advantageously used.

We advise our brother farmers, to buy *good seed*, if possible to obtain such of their neighbors, at almost any price, rather than to sow very bad seed. If none can be bought that is materially better than what the farmer has made, his next best course is to separate for seed the heaviest and most perfect grains of his entire crop, by repeated and very hard fanning. One twentieth, or one tenth, of a very bad crop, thus selected, may furnish tolerable seed; and the labor required, and the injury caused to the sample of the remainder of the crop, left for sale, will be of but little moment, compared to the value secured in the next crop.

The next palliative is to be *sparing of seed*: not by sowing any land too thinly—but by sowing no more land than is well worth being put in wheat. Those farmers whose land, or whose locality, causes the wheat crop to be generally of little (if any) profit, would do well to abandon the crop entirely. There is always much more land put in wheat than ought to be: and many farmers will be profited ultimately by this most disastrous season, if the loss now sustained should teach them that wheat is not their proper market crop. Lime in some form, and to a certain though very moderate amount, is required to produce wheat: and when a soil is supplied with very little more than the minimum of lime absolutely requisite for wheat, the growth will always be very precarious, and will seldom, and only in good seasons, return any clear profit. On good soils, supplied by nature with this valuable ingredient, (in some form,) and on the worst soils, which may be supplied with calcareous matter by the industry of man, wheat will always be one of the most valuable crops of our country. On lands naturally poor, (and still more if sandy,) and to which lime will not, or cannot be applied, the sooner wheat is abandoned the better.

THE SEASON AND STATE OF CROPS.

Though there has been some suffering from drought at particular times, the season has continued to be remarkable for the quantity of rain. Corn on high land is better than an average crop—and much worse on lowgrounds. The rich and extensive lowgrounds on the Roanoke, on which the corn was all destroyed by freshets, have been again planted, as late as in July. The new growth is good—and promises a large product for such late planting, unless cut off by early frosts. Even half a crop upon such an extensive body of very fertile land, must have considerable effect on the profits of that region of country, and on the general supply of the corn markets of Virginia and North Carolina. Tobacco is of average growth—and the quantity made in Virginia, will be unusually large, owing to the circumstance that the high price has caused a great increase of the extent of land usually cultivated in that crop. Cotton is of good growth, but is backward, and the entire crop can scarcely mature well on any land in Virginia.

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